Other Attachment File(s)

*** Mandatory Other Attachment Filename:** 1237-Community Monitoring 2022 Attachments.pdf

Add Mandatory Other Attachment | Delete Mandatory Other Attachment | View Mandatory Other Attachment

To add more "Other Attachment" attachments, please use the attachment buttons below.

Add Optional Other Attachment | Delete Optional Other Attachment | View Optional Other Attachment

EPA KEY CONTACTS FORM

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Authorized Representative: *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: Prefix: Mr. First Name: Erik Middle Name:
Last Name: Saganic Suffix:
Title: Technical Analysis Manager
Complete Address:
Street1: 1904 Third Ave Suite 105
Street2:
City: Seattle State: WA: Washington
Zip / Postal Code: 98101 Country: USA: UNITED STATES
Phone Number: 206-689-4003 **Fax Number:** 206-343-7522
E-mail Address: eriks@pscleanair.gov

Payee: *Individual authorized to accept payments.*

Name: Prefix: Ms. First Name: Karen Middle Name:
Last Name: Houser Suffix:
Title: Finance Manager
Complete Address:
Street1: 1904 Third Ave Suite 105
Street2:
City: Seattle State: WA: Washington
Zip / Postal Code: 98101 Country: USA: UNITED STATES
Phone Number: 206-689-4036 **Fax Number:** 206-343-7522
E-mail Address: karenh@pscleanair.gov

Administrative Contact: *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc).*

Name: Prefix: Ms. First Name: Karen Middle Name:
Last Name: Houser Suffix:
Title: Finance Manager
Complete Address:
Street1: 1904 Third Ave Suite 105
Street2:
City: Seattle State: WA: Washington
Zip / Postal Code: 98101 Country: USA: UNITED STATES
Phone Number: 206-689-4036 **Fax Number:** 206-343-7522
E-mail Address: karenh@pscleanair.gov

EPA Form 5700-54 (Rev 4-02)

EPA KEY CONTACTS FORM

Project Manager: *Individual responsible for the technical completion of the proposed work.*

Name: Prefix: Mr. First Name: Erik Middle Name:

Last Name: Saganic Suffix:

Title: Technical Analysis Manager

Complete Address:

Street1: 1904 Third Ave Suite 105

Street2:

City: Seattle State: WA: Washington

Zip / Postal Code: 98101 Country: USA: UNITED STATES

Phone Number: 206-689-4003 **Fax Number:** 206-343-7522

E-mail Address: eriks@pscleanair.gov

EPA Form 5700-54 (Rev 4-02)

OMB Number: 2030-0020
Expiration Date: 06/30/2024

Preaward Compliance Review Report for All Applicants and Recipients Requesting EPA Financial Assistance

Note: Read Instructions before completing form.

I. A. Applicant/Recipient (Name, Address, City, State, Zip Code)

Name: Puget Sound Clean Air Agency

Address: 1904 Third Ave, Suite 105

City: Seattle

State: WA: Washington Zip Code: 98101

B. DUNS No. 3634223740000

II. Is the applicant currently receiving EPA Assistance? ☒ Yes ☐ No

III. List all civil rights lawsuits and administrative complaints pending against the applicant/recipient that allege discrimination based on race, color, national origin, sex, age, or disability. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None

IV. List all civil rights lawsuits and administrative complaints decided against the applicant/recipient within the last year that allege discrimination based on race, color, national origin, sex, age, or disability and enclose a copy of all decisions. Please describe all corrective actions taken. (Do not include employment complaints not covered by 40 C.F.R. Parts 5 and 7.)

None

V. List all civil rights compliance reviews of the applicant/recipient conducted by any agency within the last two years and enclose a copy of the review and any decisions, orders, or agreements based on the review. Please describe any corrective action taken. (40 C.F.R. § 7.80(c)(3))

none

VI. Is the applicant requesting EPA assistance for new construction? If no, proceed to VII; if yes, answer (a) and/or (b) below.

☐ Yes ☒ No

a. If the grant is for new construction, will all new facilities or alterations to existing facilities be designed and constructed to be readily accessible to and usable by persons with disabilities? If yes, proceed to VII; if no, proceed to VI(b).

☐ Yes ☐ No

b. If the grant is for new construction and the new facilities or alterations to existing facilities will not be readily accessible to and usable by persons with disabilities, explain how a regulatory exception (40 C.F.R. 7.70) applies.

VII. Does the applicant/recipient provide initial and continuing notice that it does not discriminate on the basis of race, color, national origin, sex, age, or disability in its program or activities? (40 C.F.R 5.140 and 7.95)	☒ Yes	☐ No
a. Do the methods of notice accommodate those with impaired vision or hearing?	☐ Yes	☒ No
b. Is the notice posted in a prominent place in the applicant's offices or facilities or, for education programs and activities, in appropriate periodicals and other written communications?	☒ Yes	☐ No
c. Does the notice identify a designated civil rights coordinator?	☒ Yes	☐ No
VIII. Does the applicant/recipient maintain demographic data on the race, color, national origin, sex, age, or handicap of the population it serves? (40 C.F.R. 7.85(a))	☒ Yes	☐ No
IX. Does the applicant/recipient have a policy/procedure for providing access to services for persons with limited English proficiency? (40 C.F.R. Part 7, E.O. 13166)	☒ Yes	☐ No

X. If the applicant is an education program or activity, or has 15 or more employees, has it designated an employee to coordinate its compliance with 40 C.F.R. Parts 5 and 7? Provide the name, title, position, mailing address, e-mail address, fax number, and telephone number of the designated coordinator.

Dinah Wilson, Manager- Equity and Engagement
1904 Third Ave, Suite 105, Seattle, WA 98101
dinahw@pscleanair.gov
206-689-4023

XI. If the applicant is an education program or activity, or has 15 or more employees, has it adopted grievance procedures that assure the prompt and fair resolution of complaints that allege a violation of 40 C.F.R. Parts 5 and 7? Provide a legal citation or Internet Address for, or a copy of, the procedures.

https://pscleanair.gov/DocumentCenter/View/4170/Title-VI-Plan-PDF

For the Applicant/Recipient

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law. I assure that I will fully comply with all applicable civil rights statutes and EPA regulations.

A. Signature of Authorized Official	B. Title of Authorized Official	C. Date
Erik Saganic	Manager - Technical Analysis	03/25/2022

For the U.S. Environmental Protection Agency

I have reviewed the information provided by the applicant/recipient and hereby certify that the applicant/recipient has submitted all preaward compliance information required by 40 C.F.R. Parts 5 and 7; that based on the information submitted, this application satisfies the preaward provisions of 40 C.F.R. Parts 5 and 7; and that the applicant has given assurance that it will fully comply with all applicable civil rights statures and EPA regulations.

A. *Signature of Authorized EPA Official	B. Title of Authorized Official	C. Date

*** See Instructions**

Instructions for EPA FORM 4700-4 (Rev. 06/2014)

General. Recipients of Federal financial assistance from the U.S. Environmental Protection Agency must comply with the following statutes and regulations.
Title VI of the Civil Rights Acts of 1964 provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. The Act goes on to explain that the statute shall not be construed to authorize action with respect to any employment practice of any employer, employment agency, or labor organization (except where the primary objective of the Federal financial assistance is to provide employment). Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act provides that no person in the United States shall on the ground of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under the Federal Water Pollution Control Act, as amended. Employment discrimination on the basis of sex is prohibited in all such programs or activities. Section 504 of the Rehabilitation Act of 1973 provides that no otherwise qualified individual with a disability in the United States shall solely by reason of disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. Employment discrimination on the basis of disability is prohibited in all such programs or activities. The Age Discrimination Act of 1975 provides that no person on the basis of age shall be excluded from participation under any program or activity receiving Federal financial assistance. Employment discrimination is not covered. Age discrimination in employment is prohibited by the Age Discrimination in Employment Act administered by the Equal Employment Opportunity Commission. Title IX of the Education Amendments of 1972 provides that no person in the United States on the basis of sex shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance. Employment discrimination on the basis of sex is prohibited in all such education programs or activities. Note: an education program or activity is not limited to only those conducted by a formal institution. 40 C.F.R. Part 5 implements Title IX of the Education Amendments of 1972. 40 C.F.R. Part 7 implements Title VI of the Civil Rights Act of 1964, Section 13 of the 1972 Amendments to the Federal Water Pollution Control Act, and Section 504 of The Rehabilitation Act of 1973. The Executive Order 13166 (E.O. 13166) entitled; "Improving Access to Services for Persons with Limited English Proficiency" requires Federal agencies work to ensure that recipients of Federal financial assistance provide meaningful access to their LEP applicants and beneficiaries.

Items "Applicant" means any entity that files an application or unsolicited proposal or otherwise requests EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Recipient" means any entity, other than applicant, which will actually receive EPA assistance. 40 C.F.R. §§ 5.105, 7.25. "Civil rights lawsuits and administrative complaints" means any lawsuit or administrative complaint alleging discrimination on the basis of race, color, national origin, sex, age, or disability pending or decided against the applicant and/or entity which actually benefits from the grant, but excluding employment complaints not covered by 40 C.F.R. Parts 5 and 7. For example, if a city is the named applicant but the grant will actually benefit the Department of Sewage, civil rights lawsuits involving both the city and the Department of Sewage should be listed. "Civil rights compliance review" means any review assessing the applicant's and/or recipient's compliance with laws prohibiting discrimination on the basis of race, color, national origin, sex, age, or disability. Submit this form with the original and required copies of applications, requests for extensions, requests for increase of funds, etc. Updates of information are all that are required after the initial application submission. If any item is not relevant to the project for which assistance is requested, write "NA" for "Not Applicable." In the event applicant is uncertain about how to answer any questions, EPA program officials should be contacted for clarification. * Note: Signature appears in the Approval Section of the EPA Comprehensive Administrative Review For Grants/Cooperative Agreements & Continuation/Supplemental Awards form.

Project Narrative File(s)

*** Mandatory Project Narrative File Filename:** 1236-Final_Project Narrative_032422.pdf

Add Mandatory Project Narrative File | Delete Mandatory Project Narrative File | View Mandatory Project Narrative File

To add more Project Narrative File attachments, please use the attachment buttons below.

Add Optional Project Narrative File | Delete Optional Project Narrative File | View Optional Project Narrative File

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2022

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Enhanced Air Quality Monitoring for Communities	66.034	$	$	$ 243,888.00	$ 29,518.00	$ 273,406.00
2.						
3.						
4.						
5. Totals		$	$	$ 243,888.00	$ 29,518.00	$ 273,406.00

Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1) Enhanced Air Quality Monitoring for Communities	(2)	(3)	(4)	(5)
a. Personnel	$ 14,032.00	$	$	$	$ 14,032.00
b. Fringe Benefits	5,672.00				5,672.00
c. Travel	0.00				0.00
d. Equipment	133,000.00				133,000.00
e. Supplies	25,000.00				25,000.00
f. Contractual	0.00				0.00
g. Construction	0.00				0.00
h. Other	53,319.00				53,319.00
i. Total Direct Charges (sum of 6a-6h)	231,023.00				$ 231,023.00
j. Indirect Charges	12,865.00				$ 12,865.00
k. TOTALS (sum of 6i and 6j)	$ 243,888.00	$	$	$	$ 243,888.00
7. Program Income	$ 0.00	$	$	$	$ 0.00

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Standard Form 424A (Rev. 7- 97)
Prescribed by OMB (Circular A -102) Page 1A

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. Enhanced Air Quality Monitoring for Communities	$ 82,024.00	$	$	$ 82,024.00
9.				
10.				
11.				
12. TOTAL (sum of lines 8-11)	$ 82,024.00	$	$	$ 82,024.00

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 243,888.00	$ 60,972.00	$ 60,972.00	$ 60,972.00	$ 60,972.00
14. Non-Federal	$ 29,518.00	7,379.00	7,379.00	7,379.00	7,381.00
15. TOTAL (sum of lines 13 and 14)	$ 273,406.00	$ 68,351.00	$ 68,351.00	$ 68,351.00	$ 68,353.00

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. Enhanced Air Quality Monitoring for Communities	$ 161,736.00	$ 93,784.00	$	$
17.				
18.				
19.				
20. TOTAL (sum of lines 16 - 19)	$ 161,736.00	$ 93,784.00	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges: Total: $429,117.00

22. Indirect Charges: Base: $107,660.00; Total: $70,291.00

23. Remarks: 65.29% projected Federal Negotiated Indirect Cost Rate (fixed rate based on fiscal year 2018; the older of the two rates found in the appendix of this application)

OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/25/2022

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: Puget Sound Clean Air Agency

* b. Employer/Taxpayer Identification Number (EIN/TIN): 91-0823558

* c. Organizational DUNS: 3634223740000

d. Address:

* Street1: 1904 3rd Ave Suite 105
Street2:
* City: Seattle
County/Parish: King
* State: WA: Washington
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 98101-3317

e. Organizational Unit:

Department Name: Technical Analysis

Division Name: Air Quality Programs

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: Mr.
* First Name: Erik
Middle Name:
* Last Name: Saganic
Suffix:

Title: Manager - Technical Analysis

Organizational Affiliation: Puget Sound Clean Air Agency

* Telephone Number: 206-689-4003
Fax Number: 206-343-7522

* Email: eriks@pscleanair.gov

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

D: Special District Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.034

CFDA Title:

Surveys, Studies, Research, Investigations, Demonstrations, and Special Purpose Activities Relating to the Clean Air Act

*** 12. Funding Opportunity Number:**

EPA-OAR-OAQPS-22-01

* Title:

Enhanced Air Quality Monitoring for Communities

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

1234-Areas Affected by Project.pdf | Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Community-directed monitoring with TREE trailer (Trailer for Researching Environmental Equity) as central hub with branching sensors to characterize air quality in highly impacted communities

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: WA-007 * b. Program/Project: WA-009

Attach an additional list of Program/Project Congressional Districts if needed.

1235-Congressional Districts.pdf | Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 11/01/2022 * b. End Date: 10/31/2025

18. Estimated Funding ($):

* a. Federal	499,408.00
* b. Applicant	82,024.00
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	581,432.00

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: Mr. * First Name: Erik

Middle Name:

* Last Name: Saganic

Suffix:

* Title: Manager - Technical Analysis

* Telephone Number: 206-689-4003 Fax Number: 206-343-7522

* Email: eriks@pscleanair.gov

* Signature of Authorized Representative: Erik Saganic * Date Signed: 03/25/2022

Manifest for Grant Application # GRANT13580031

Grant Application XML file (total 1):

1. GrantApplication.xml. (size 26437 bytes)

Forms Included in Zip File(total 6):

1. Form ProjectNarrativeAttachments_1_2-V1.2.pdf (size 16019 bytes)

2. Form SF424_3_0-V3.0.pdf (size 24319 bytes)

3. Form SF424A-V1.0.pdf (size 23324 bytes)

4. Form EPA4700_4_3_0-V3.0.pdf (size 22780 bytes)

5. Form OtherNarrativeAttachments_1_2-V1.2.pdf (size 15912 bytes)

6. Form EPA_KeyContacts_2_0-V2.0.pdf (size 37292 bytes)

Attachments Included in Zip File (total 4):

1. SF424_3_0 SF424_3_0-1235-Congressional Districts.pdf application/pdf (size 33419 bytes)

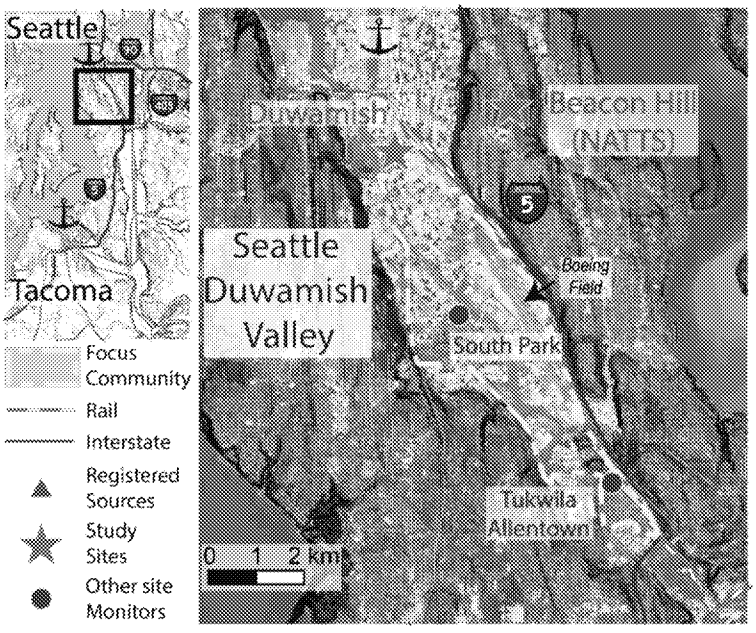
2. ProjectNarrativeAttachments_1_2 ProjectNarrativeAttachments_1_2-Attachments-1236-Final_Project Narrative_032422.pdf application/pdf (size 588059 bytes)

3. SF424_3_0 SF424_3_0-1234-Areas Affected by Project.pdf application/pdf (size 685231 bytes)

4. OtherNarrativeAttachments_1_2 OtherNarrativeAttachments_1_2-Attachments-1237-Community Monitoring 2022 Attachments.pdf application/pdf (size 1935577 bytes)

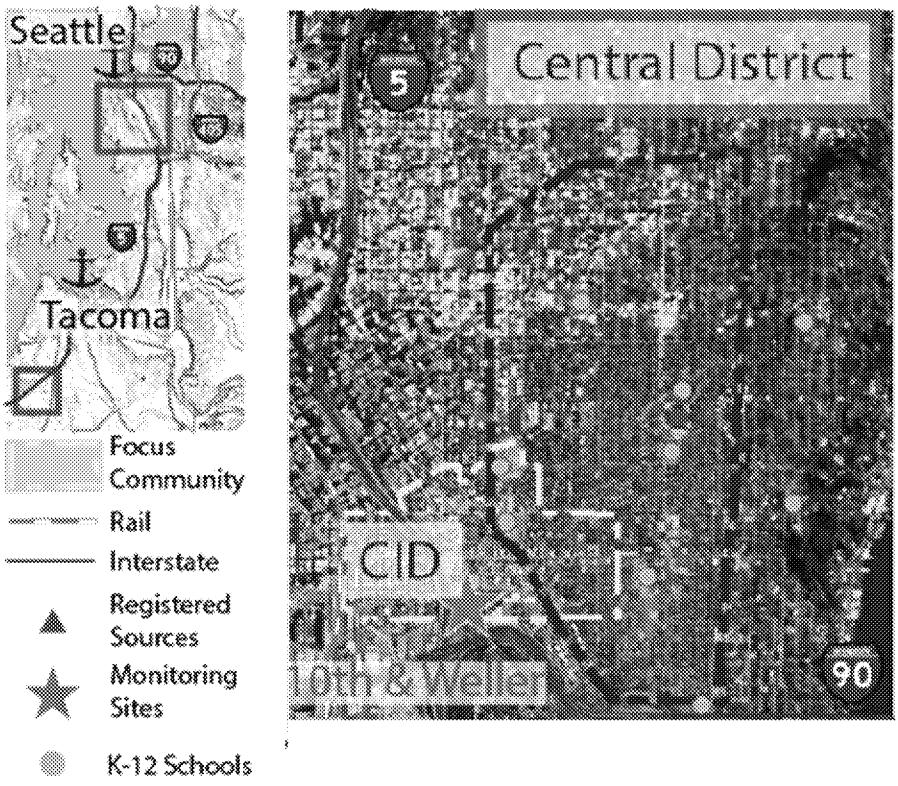
WA-007, WA-009, WA-010

The Duwamish Valley focus community includes the neighborhoods of Tukwila-Allentown, Seattle Georgetown and South Park, all rooted in industrial settings. The community is bounded by railyards, a major airport (Boeing Field), industrial sources, and major roadways. The area is a Superfund site, which has had a century of industrial pollution and studies have shown substantial deposition into the ground water and soils of PCBs and metals, including substantial buildup in the Duwamish Waterway. We have partnered with this community over the years in many ways.[1]

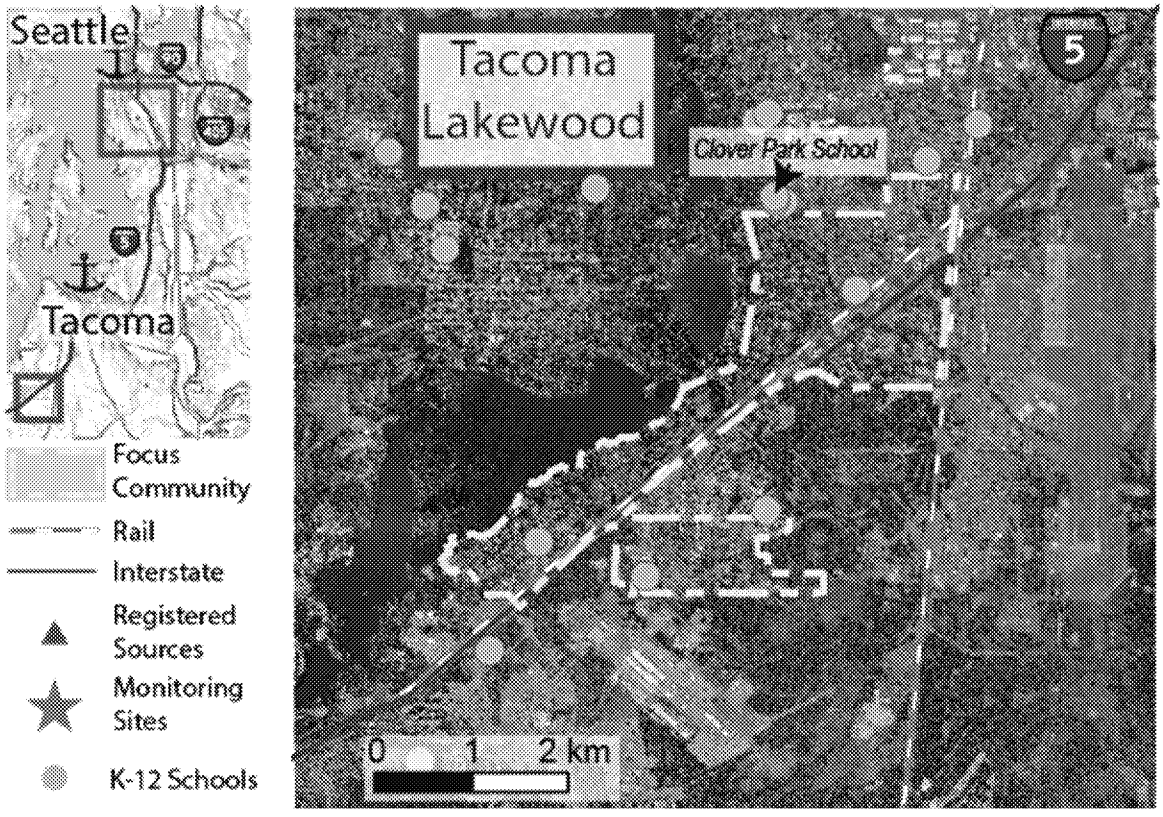


Seattle's Chinatown-International District focus community has been a vital centerpiece of Seattle's Asian American community, with a rich multiethnic neighborhood of Chinese, Japanese, Vietnamese, Filipino and other origins. Bounded by Interstate 90 to the South and cut by Interstate 5, they are exposed to the highest traffic volumes of the Pacific Northwest.[2] The Community Air Tool ranks this community in the top 1% most disproportionately impacted areas in our jurisdiction.

The Seattle Central District community is vibrant and includes a very diverse population. It is considered by some to be the center of the African American community in Seattle with many engaged community groups dedicated to keeping the community thriving. It has been experiencing a lot of development resulting in gentrification and rising costs. While not an identified focus community, the area is very much disproportionately impacted by air pollution and other injustices. The Agency is looking forward to developing long-standing partnerships in the community.



The Lakewood focus community has a rich history, commercial districts, parks, and a diverse population. Lakewood and the larger, adjacent Tacoma-Pierce County $PM_{2.5}$ maintenance area (for the 2006 24-hour $PM_{2.5}$ standard), is intersected by Interstate 5, contains several state highways, a large industrial footprint, and a major air-force military base. Lakewood is the Agency's newest focus community which was identified in 2019.[3]



[1] Puget Sound Clean Air Agency, "Duwamish Valley", https://pscleanair.gov/385/Duwamish-Valley
[2] Schulte, Jill, "Traffic Density, Census Demographics and Environmental Equity in Housing: A geographic analysis in urban King County", Nov 2012, prepared for the King County Equity and Social Justice Initiative.
[3] Puget Sound Clean Air Agency, "Lakewood", https://www.pscleanair.gov/386/Lakewood

ATTACHMENTS

ERIK SAGANIC

1904 3rd Ave, Ste 105
Seattle, WA 98101
Ex. 6 Personal Privacy (PP)
eriks@pscleanair.gov

Principle Investigator, Technical Analysis Manager

SUMMARY OF QUALIFICATIONS:

- Managed past large EPA grants, two with community-directed sampling, the most recent a $650K study.
- Outstanding leadership and management skills used across diverse situations.
- Deep and local air quality experience, with 16 years at the Agency, and 22 years in related scientific fields.
- Demonstrated ability to create innovative solutions to challenging problems.
- Excellent communication skills developed from managing, teaching, public meetings, and presentations.

EDUCATION:

University of Washington, Seattle, WA
M.S. in Chemistry, 2003.

Brown University, Providence, RI
B.S. in Chemistry, 2000.

RELATED WORK EXPERIENCE:

Technical Analysis Manager, *Puget Sound Clean Air Agency*, Nov 2018 – present.

- Guided the Air Monitoring and Planning, Analysis, and Forecasting Teams (7 staff).
- Navigated work through a critical time with staff vacancies, planned for future needs, and posted job openings.
- Regularly assessed general progress of staff and provided applicable feedback, through mid-year check-ins and other check-ins as needed.
- Reviewed and steered various technical products (e.g. rule-making or new air monitor mapping) and staff presentations (e.g. for Board and Advisory Council).
- Directed on-going and new projects, including planning for work in next fiscal year's budget.
- Maintained regular internal communications with staff of all the on-goings at the Agency through many personal interactions, group meetings, and email.
- Continued to build external strategic relationships, from academic and government public health partners to community-led non-profit organizations (e.g. discussing technical aspects of N95 masks before wildfire smoke season).
- Represented the Technical Analysis team and actively participated at management meetings and in the Division Director's leadership meetings.
- Presented to the Board and Advisory Council and wrote monthly about the group's work in the Director's Board update.
- Modeled principles of social justice and equity as a Champion Manager for the Duwamish Valley Team, in climate discussions, and active participant in racial caucusing group meetings.
- Stayed apprised on new legislation and managed technical requests accordingly on short-turn arounds.
- Managed the team during a high-pressure situation, as the only forecasting expert in the office for last summer's wildfire smoke season.

Air Quality Planner, Forecaster, and Analyst, *Puget Sound Clean Air Agency*, 2010 – 2018.

- Often acted as a staff toxicologist and epidemiologist and also stayed up-to-date on the most recent air quality health trends and developments.
- Performed fast, thoughtful, and accurate analyses for a variety of air related issues (e.g. analysis for I-1631, the C-ID air toxics study).
- Experience with press interviews regarding wildfire smoke, emergency industrial fires, wood smoke, construction projects, and diesel exhaust concerns (and even an unknown mystery stench).
- Experience with various stakeholders on sensitive topics, including in lower socio-economic communities (e.g. nonattainment process or dust concerns in the Duwamish).
- Regularly assessed air quality and meteorological models to forecast air pollution (e.g. burn bans and smog alerts).
- Routinely performed geographic analyses with GIS using census information and other tools (e.g. the Community Air Tool).
- Consulted with the air monitoring group on special studies (e.g. air toxics studies or mobile monitoring).
- Performed highly technical analysis using statistics and sophisticated software.
- Innovated in various ways including air quality web displays and testing filter-fans to mitigate air pollution.

Quality Assurance Specialist, *Puget Sound Clean Air Agency*, 2006 – 2010.

- Managed over 2 EPA grants simultaneously with over 1 million dollars in funding, including budgets and contractors.
- Guided the agency in following EPA regulations for NAAQS compliance.
- Authored QA Project Plans for new research studies and coordinated all activities from project start through report writing.
- Analyzed data for source apportionment studies, air quality forecasting, models, health risk assessments, and equipment functionality.

EXAMPLES OF AGENCY PUBLICATIONS WITH PARTIAL OR FULL AUTHORSHIP:

- Air Toxics Study in the Chinatown-International District (2018): https://www.pscleanair.org/DocumentCenter/View/3398/Air-Toxics-Study-in-the-Chinatown-International-District-Full-Report
- Tacoma and Seattle Air Toxics Study (executive summary and full report) (2010): https://www.pscleanair.org/DocumentCenter/View/2360, https://www.pscleanair.org/DocumentCenter/View/2361
- Evaluation of New Methods for Source Apportionment Using Real-Time Continuous Monitoring Instruments (2010): https://www3.epa.gov/ttnamti1/files/20072008csatam/PSCAA_Methods_FR.pdf

OTHER SCIENTIFIC PUBLICATIONS:

- "Measurement of spatial and temporal variation in volatile hazardous air pollutants in Tacoma, Washington, using a mobile membrane introduction mass spectrometry (MIMS) system", Nicholas Davey, Erik Saganić, et al, Hazard Subst Environ Eng (2014), 49 (11), 1199-1208.
- "Reactions of Tp-Os nitrido complexes with the nucleophiles hydroxide and thiosulfate." Wu, Adam; Saganic, Erik; et al Inorganica Chimica Acta (2006), 359(9), 2842-2849
- "Nucleophilic Aromatic Substitution on Aryl-Amido Ligands Promoted by Oxidizing Osmium(IV) Centers" Jake D. Soper, Erik Saganic, et al, Inorganic Chemistry (2004), 43, 5804-5815.
- "Osmium Phosphiniminato Complexes: Synthesis, Protonation, Structure, and Redox-Coupled Hydrolytic Scission of N-P Bonds" Brian K. Bennett, Erik Saganic, et al, Inorganic Chemistry (2003), 42, 4127-4134.
- "Further investigations into nucleophilic attack at ligands of TpOs complexes", Erik Saganic, Master's Thesis (2003), University of Washington Library

ISHA KHANNA

Air Resources Specialist

1904 Third Avenue, Suite 105, Seattle, WA, USA

Ex. 6 Personal Privacy (PP)

Professional Summary

Environmental researcher with specialization in air quality management, environmental health, and climate studies. Over eight years' experience managing international and national environmental projects focused on emission characterization, greenhouse gas inventories, and air pollution health impacts assessments for different clients, stakeholders and funding agencies in US, UK, and South Asia.

WORK EXPERIENCE

Puget Sound Clean Air Agency, Seattle, USA **Air Quality Specialist** **2019-Present**

- Managed GHG emission inventory project in partnership with King County for creating geographic and consumption-based GHG inventory for the four-county region for 2019.
- Created R Scripts to automate getting real-time air quality data from monitoring sites through the API to Agency's Telemetry database and Air Graphing tools which led to elimination of FTP process.
- Created Purple Air map with their zone of influence in ArcGIS which helped Focus Communities and Lending Library programs to identify and serve the gap areas in four-county region of Washington to make air quality more equitable for all.
- Conducted data analysis for assessing trends in air quality for different pollutants and air toxics for Data Summary report using R scripts to automate the process for 2019 and 2020. Developed Tableau dashboards for data visualization of air quality trends for dissemination to public and stakeholders.

The Energy & Resources Institute (TERI), India **Associate Fellow** **2018-2019**

- Led South-Asia project on assessing air pollution scenario in India, Nepal, and Bangladesh; conducted stakeholder consultations in each country for finding the key focus areas. Managed nine people and reported to Division Director. Formulated recommendations for policy changes for regional (multi-country) actions to achieve compliance.
- Managed project on creating grid-wise emission inventory accounting for various sources in Ludhiana city for present and future under different control options. Conducted source apportionment using inventory data and air quality models (CMB and PMF) and their associated health impacts and co-benefits on reducing emissions. Prepared action plan after prioritizing the control options.

Indian Institute of Technology (IIT) Delhi, India **Research Associate** **2017-2018**

- Managed bilateral (UK-India) project on assessing contribution of influx from NCR towns towards Delhi's air quality and vice-versa using ambient monitoring and source profiling at various locations in Delhi and NCR region.
- Collaborated with local government agencies for selection of ambient air quality monitoring sites and conducting monitoring campaigns at different locations in Delhi and NCR towns for source apportionment study.

EDUCATION

Indian Institute of Technology (IIT) Delhi, India
Ph.D., Atmospheric Sciences 2013-2017
Ph.D. Thesis: Chemical Characterization and Source Apportionment of $PM_{2.5}$ at Kerbside Locations in Delhi city
Advisers: Prof Mukesh Khare, IIT Delhi, India and Dr. Prashant Gargava, Central Pollution Control Board, India

TERI University, India
M.Sc. Environmental Studies 2010-2012
M.Sc. Thesis: Spatio-temporal variation, indoor-outdoor relationship of particulate matter and associated health risk
Adviser: Prof Suresh Jain, TERI University

Bhaskaracharya College of Applied Sciences, University of Delhi, India 2007-2010
B.Sc. (H) Biomedical Sciences

SELECTED PUBLICATIONS

- **Khanna, I.** and Sharma, S., 2020. Could the National Capital Region serve as a control region for effective air quality management in Delhi?, Policy Brief, CCAPC/2020/02, *Collaborative Clean Air Policy Centre*, New Delhi
- Gulia, S., **Khanna, I.**, Shukla, K. and Khare, M., 2019. Ambient air pollutant monitoring and analysis protocol for low- and middle-income countries: An element of comprehensive urban air quality management framework. *Atmospheric Environment*. doi: 10.1016/j.atmosenv.2019.117120
- Sharma, S., **Khanna, I.**, and Ghosh, P., 2019. Scoping Study for South Asia Air Pollution. New Delhi: The Energy and Resources Institute (TERI)
- Datt, D., Sharma, S., Khanna, I., et al., 2019. Strengthening Green Fiscal Federalism in India. New Delhi: The Energy and Resources Institute (TERI)
- Datta, A., Rahman, H., and **Khanna, I.**, 2019. Air Quality and Pollution. *TERI Energy & Environment Data Dairy and Yearbook 2017/18*. The Energy and Resources Institute, New Delhi, pp.213-262.
- **Khanna, I.**, Khare, M., Gargava, P. and Khan, A.A., 2018. Effect of $PM_{2.5}$ chemical constituents on atmospheric visibility impairment. *Journal of the Air & Waste Management Association*. doi: 10.1080/10962247.2018.1425772
- Khare, M. and **Khanna, I.**, 2016. Case Studies of Source Apportionment from the Indian Sub-continent. *Airborne Particulate Matter: Sources, Atmospheric Processes and Health, Issues in Environmental Science and Technology No. 42,* The Royal Society of Chemistry, pp.315-343.
- **Khanna, I.**, Khare, M. and Gargava, P., 2015. Health risks associated with heavy metals in fine particulate matter: a case study in Delhi city, India. *Journal of Geoscience and Environment Protection*, *3*(02), p.72. doi:10.4236/gep.2015.32012
- Gulia, S., Nagendra, S.S., Khare, M. and **Khanna, I.**, 2015. Urban air quality management-A review. *Atmospheric Pollution Research*, *6*(2), pp.286-304. doi:10.5094/APR.2015.033

GRAEME NOWELL CARVLIN

Air Resource Specialist

1904 3rd Ave, Suite 105
Seattle, WA 98101
Ex. 6 Personal Privacy (PP)
E: GraemeC@pscleanair.gov

SUMMARY OF QUALIFICATIONS:

- Over 7 years working on community-directed air quality projects to empower communities affected by environmental justice issues
- Extensive data analysis and programming experience (100-500,000 lines of code: R; 10-100,000 lines: python, C++, JavaScript, CSS, HTML)
- Skilled at written and oral science communication for technical and non-technical audiences

EDUCATION:

2014 – 2018	University of Washington	
	Ph.D.	Environmental and Occupational Health
	Dissertation: *Community Air Monitoring of Particulate Matter in Imperial County, CA*	
2012 – 2013	University of California, San Diego	
	M.S.	Chemistry
2008 – 2012	University of Chicago	
	B.A.	Environmental Studies

RELATED WORK EXPERIENCE:

2019 – Current Puget Sound Clean Air Agency
Air Resource Specialist

Perform data analyses for air quality studies. Design and deploy web tools to help the public interpret air quality data including a sensor map with QC'd and calibrated sensor data and a data analysis tool to help the public analyze their sensor data.

2017 – 2019 Puget Sound Clean Air Agency
Air Monitoring Specialist II

Maintain the regulatory air monitoring network. Analyze data from low-cost air sensors, compare their performance against regulatory monitors, and provide summary results to communities. Created the sensor loan program so the public can borrow air sensors to help answer their air quality questions.

2018 – Current Self-Employed
Air Monitoring Design Consultant

Designed new PM and gas air monitors for use by community groups and in academic studies. Monitors are used throughout California to help achieve the goals of AB-617 – reducing air pollution in environmental justice focus communities. Personal and community monitors are used by researchers to investigate exposure to air pollution.

2014 – 2018 Edmund Seto Lab Group
University of Washington
Research Assistant

Worked on the development of low-cost networked air pollution monitors. Participated in many air pollution studies including personal monitoring of pregnant women in China and community monitoring in the highly impacted region of Imperial County, California. Managed a group of 10 undergraduate researchers to help build 100 custom air quality monitors that were deployed across the country. Received a $50k grant to commercialize said monitors.

AGENCY PUBLICATIONS

- Air Toxics Study in the Chinatown-International District (2018): https://www.pscleanair.org/DocumentCenter/View/3398/Air-Toxics-Study-in-the-Chinatown-International-District-Full-Report

MANUSCRIPTS

Carvlin, G.N.; Lugo, H.; Olmedo, L.; Bejarano, E.; Wilkie, A.; Meltzer, D.; Wong, M.; King, G.; Northcross, A.; Jerrett, M.; English, P.B.; Shirai, J.; Yost, M.; Larson, T.; Seto, E. Use of Citizen Science-Derived Data for Spatial and Temporal Modeling of Particulate Matter near the US/Mexico Border. *Atmosphere* **2019**, *10*, 495.

Seto, E.; **Carvlin, G.**; Austin, E.; Shirai, J.; Bejarano, E.; Lugo, H.; Olmedo, L.; Calderas, A.; Jerrett, M.; King, G.; Meltzer, D.; Wilkie, A.; Wong, M.; English, P. Next-Generation Community Air Quality Sensors for Identifying Air Pollution Episodes. *Int. J. Environ. Res. Public Health* **2019**, *16*, 3268.

Duncan GE, Seto E, Avery AR, Oie M, **Carvlin G**, Austin E, Shirai JH, He J, Ockerman B, Novosselov I. Usability of a Personal Air Pollution Monitor: Design-Feedback Iterative Cycle Study. *JMIR Mhealth Uhealth* **2018**, *6*, 12.

Wong, M.; Bejarano, E.; **Carvlin, G.**; Fellows, K.; King, G.; Lugo, H.; Jerrett, M.; Meltzer, D.; Northcross, A.; Olmedo, L.; Seto, E.; Wilkie, A.; English, P. Combining Community Engagement and Scientific Approaches in Next-Generation Monitor Siting: The Case of the Imperial County Community Air Network. *Int. J. Environ. Res. Public Health* **2018**, *15*, 523.

Carvlin, G; Lugo, H; Olmedo, L; Bejarano, E; Wilkie, A; Meltzer, D; Wong, M; King, G; Northcross, A; Jerrett, M; English, P; Hammond, D; Seto, E. Development and field validation of a community-engaged particulate matter air quality monitoring network in Imperial, California, USA. *Journal of the Air & Waste Management Association* **2017**, *67*, 12.

English, P; Olmedo, L; Bejarano, E.; Lugo, H; Murillo, E; Seto, E; Wong, M; King, G; Wilkie, A; Meltzer, D; **Carvlin, G**; Jerrett, M; Northcross, A. The Imperial County Community Air Monitoring Network: A Model for Community-based Environmental Monitoring for Public Health Action. *Environmental Health Perspectives* **2017**, *125*, 7.

Philip C. Swartzendruber, Ph.D.

Air Resource Specialist

1904 3rd Ave, Suite 105 | Seattle, WA 98101 | phils@pscleanair.gov

www.pscleanair.gov

Summary of Qualifications

Atmospheric scientist with over 15 years of experience measuring air quality. Extensive experience collaborating with federal, state, local, and university partners on air quality modeling. Committed to outreach and communication.

Education

2009 **Ph.D., Atmospheric Sciences**, University of Washington, Seattle.
1998 **B.A. Physics**, Minor in Secondary Education, Goshen College, Goshen, IN.

Selected Research and Professional Activities

Air Quality Scientist, Puget Sound Clean Air Agency, Seattle, WA
9/2010 – present

- Technical design and analysis of specialized air quality monitoring projects such as the 2016 Chinatown-International District Toxics study, ongoing review of air quality monitoring network, development of air quality forecasting tools, writing technical summaries and communicating science and risk information for the Agency's Board of Directors, management, stakeholders, and the public.
- Routine forecasting of air quality including advising for wintertime residential woodburning restrictions and summer wildfire smoke alerts.
- Worked with EPA, UW, WSU, and other federal, state, and local air quality partners for the collaborative development of weather and air quality modeling systems including wildfire impacts on air quality and meteorology: NW Modeling Consortium and NW AIRPACT.
- Use and development of air quality modeling and forecasting tools including AERMOD, EPA's PMF model, EPA's COBRA model, WRF, and a custom developed statistical box model (SAQM) for fine PM.
- Numerous presentations and outreach activities including: extended technical and policy presentation to the Board of Directors, TV and radio interviews, public forums, other specific events include: the WILD youth leadership program, appearances on Spanish-language radio program to discuss air quality, guest lecturer in UW Introduction to Atmos. Sciences, UW Public Health Air Pollution class, Univ. Puget Sound class, invited speaker for the Fairbanks North Star Borough, Clearing the Air Conference.

Post Doctoral Researcher, University of Miami
7/2009 - 8/2010

- Development of laser induced fluorescence (LIF) techniques for studying atmospheric mercury.

Doctoral Research, Atmospheric Sciences, Univ. of Washington
9/2003 - 3/2009

- Development of *in situ* measurement techniques of part-per-quadrillion mixing ratios of mercury species at a mountain-top site and with a custom built aircraft platform. Led field measurements to help evaluate a global geochemical model of mercury cycling.

- Analysis of numerous chemical and meteorological parameters using advanced statistical techniques (compositing, principal component analysis, bootstrapping, spectral decomposition, non-parametric and robust tests). Research included analysis of data to identify wildfire smoke plumes.

Junior Principle Investigator, Frontier Geosciences, Seattle, WA
10/1999-8/2003

- Technical design, development, analysis, operation, and reporting for specialized mercury measurements.

Professional Activities

Peer Reviewer for: *Science of the Total Environment, Geophysical Research Letters, Atmospheric Research, Environmental Pollution, Atmospheric Chemistry and Physics, Journal of Atmospheric Chemistry.*

Selected Peer Reviewed Publications

1. **Swartzendruber, P.C**. and Jaffe, D.A., *Sources and Transport: A Global Issue*, in *Mercury in the Environment: Pattern and Process*, Ed. Michael Bank, Univ. California Press, Berkeley, CA, May 2012.

2. Ren, X., W.T. Luke, P. Kelley, M. Cohen, F. Ngan, R. Artz, J. Walker, S. Brooks, C. Moore, **P. Swartzendruber**, D. Bauer, J. Remeika, A. Hynes, J. Dibb, J. Rolison, N. Krishnamurthy, W. M. Landing, A. Hecobian, J. Shook, L. G. Huey, Mercury Speciation at a Coastal Site in the Northern Gulf of Mexico: Results from the Grand Bay Intensive Studies in Summer 2010 and Spring 2011, Atmosphere 2014, 5(2), 230-251; doi:10.3390/atmos5020230

3. **Swartzendruber, P.C.,** D.A. Jaffe, B. Finley, Development and first results of an aircraft based, high time resolution technique for gaseous elemental and reactive (oxidized) gaseous mercury, Environ. Sci. Techn., doi:10.1021/es901390t.

4. **Swartzendruber, P.C.,** D.A. Jaffe, Improved fluorescence peak integration in the Tekran 2537 with sub-optimal Hg mass loadings, Atmos. Environ., 43(2009) 3648-3651, doi:10.1016/j.atmosenv.2009.02.063.

5. **Swartzendruber, P.C**., D.A. Jaffe, D. Chand, J. Smith, D. Reidmiller, L. Gratz, J. Keeler, S. Strode, L. Jaegle, R. Talbot. The vertical distribution of mercury, CO, ozone, and aerosol scatter in the Pacific Northwest during the spring 2006 INTEX-B campaign, J. Geophys. Res., 113, D10305, doi:10.1029/2007JD009579, 2008.

Matthew C. Harper

Air Monitoring Lead

1904 3rd Ave, Suite 105 | Seattle, WA 98101
matth@pscleanair.gov

Extensive experience (19 years) leading and coordinating a team to operate a network of air quality monitoring stations. Expert in both the science side of air quality monitoring (i.e. sensor operation, data management) and the logistics side (i.e. budgeting, contracts).

RELATED WORK EXPERIENCE:

Air Monitoring Lead, *Puget Sound Clean Air Agency*, 2003 – present.

- Responsible for leading the air monitoring team of 5 staff members to complete all air monitoring work for the agency.
- Operates and maintains a network of 13 air monitoring stations making air quality and meteorological measurements, including instrumentation data collection, data reporting, data validation, filter sampling, laboratory coordination, and data analysis.
- Responsible for budgeting activities and expenses for the air monitoring program including time allocation, day to day operations, purchasing capital equipment, purchasing maintenance supplies and tools.
- Maker of micro-sensor air monitoring tools, including car and backpack based air quality measurement systems, deployment of black carbon, particle counter, and CO micro-sensing tools. 3 years of experience in micro-sensing tool development including Arduino IDE, C++ programs, and data acquisition systems.

Relevant Project Experience.

- "Highway Air Toxics Impacts in the Chinatown-International District of Seattle, 2015-2018", EPA Grant Agreement XA-01J10401
- "2012-2013 Winter Monitoring Study: Using Nephelometers to assess Fine Particulates in King and Pierce Counties"
- "Tacoma and Seattle Area Air Toxics Evaluation" October 2010, produced cooperatively by the Puget Sound Clean Air Agency and the University of Washington under EPA Grant Agreement XA96069801.
- "Evaluation of Methods for Air Toxics Source Apportionment Using Real-Time Continuous Monitoring Instruments" produced cooperatively by the Puget Sound Clean Air Agency and the University of Washington under EPA Grant Agreement XA960668

EDUCATION:

University of New Haven, West Haven, CT
M.B.A. Marketing, GPA 3.95/4.0, August 2000.

Boston University, Boston, MA
B.S. Manufacturing Engineering, May 1994.

James R. Laing

Air Monitoring Specialist II
jamesl@pscleanair.gov | www.pscleanair.gov

RELATED WORK EXPERIENCE

Air Monitoring Specialist, Puget Sound Clean Air Agency, Seattle, US **2022-present**
Responsible for maintaining the air monitoring network.

Senior Air Monitoring Specialist, Washington State Department of Ecology Air Quality Program, Seattle, US **2019-2022**
Primary operator for O_3, CO, SO_2, NOy, NO_2, PM2.5, and meteorological instruments. Lead operator for the Photochemical Assessment Monitoring Station (PAMS) at Seattle-Beacon Hill. Measurements include carbonyls, mixing layer height using a ceilometer, solar and UV radiation using a radiometer and pyranometer, and hourly averaged speciated volatile organic compounds (VOCs) using a Gas Chromatograph System. Responsible for writing and reviewing Ecology's Standard Operating Procedure Documents and verifying documents are accessible.

Postdoctoral Research Associate, University of Washington Bothell, Bothell, WA **2015-2019**
Studied air quality issues related to wildfire smoke and its impact on urban areas.
Coordinated instrument deployment and research goals for the Mt. Bachelor Observatory Research Station on the summit of Mt. Bachelor in central Oregon.
Routine maintenance, calibrations, and data QA/QC for the long-term gaseous and aerosol measurements at Mt. Bachelor.
Responsible for summer and spring campaigns to investigate physical and optical aerosol properties of aged biomass burning plumes and long-range pollution events from Asia.

EDUCATION

Clarkson University, Potsdam, NY
M.S. Environmental Science and Engineering
Ph.D. Environmental Science and Engineering
Boston University, Boston, MA
B.S., Environmental Science

SELECTED PUBLICATIONS

- **Laing, J.R.** and D. A. Jaffe. 2019. Wildfires Are Causing Extreme PM2.5 Concentrations in the Western US: How increases in wildfire smoke have impacted air quality in the western United States. A&WMA EM Magazine. June 2019.
- **Laing, J.R.**, D. A. Jaffe, A. P. Slavens, W. Li, W. Wang. 2017. Can ΔPM2.5/ΔCO and ΔNOy/ΔCO Enhancement Ratios Be Used to Characterize the Influence of Wildfire Smoke in Urban Areas? Aerosol and Air Quality Research 17, 2413-2423 doi: 10.4209/aaqr.2017.02.0069.
- **Laing, J.R.**, P. K. Hopke, E.F. Hopke, L. Husain, V.A. Dutkiewicz, J. Paatero, Y. Viisanen. 2013. Long-term Trends of Biogenic Sulfur Aerosol and its Relationship with Sea Surface Temperature in Arctic Finland. Journal of Geophysical Research: Atmospheres 188, 11,770-11,776 doi:10.1002/2013JD020384.

Clément Miège

Air Monitoring Specialist

1904 Third Avenue, Suite 105, Seattle, WA, USA

Ex. 6 Personal Privacy (PP) | EMAIL: clementm@pscleanair.gov

Summary

Research expertise: Air quality monitoring (particulate matter, chemical compounds, filter-based sampling), Environmental monitoring (temperature, pressure, wind, and radiative energy balance, snow), hydrology monitoring (aquifer tests, dilution tests, water sampling), applied geophysics (GPS, radar, seismic, magnetic resonance), remote sensing (synthetic aperture radar, visible), polar drilling (mechanical and thermal), polar hydrology (englacial aquifers, supraglacial rivers) and modelling (1-D snowpack, 2-D groundwater).
Computing: Windows (12 yr)/ Linux (2 yr) -- Matlab (12 yr)/ R (1 yr)/ JavaScript (2 mo) -- QGIS (6 yr)/ Google Earth (8 yr)/ ArcGIS (2 yr) -- Adobe Illustrator (8 yr) -- Google Apps (5 yr)
Languages: Bilingual English & French, basic conversational Spanish

Education

Ph.D., Geography, University of Utah, *Salt Lake City, UT, United States* 2015
M.Sc., Earth and Environmental Sciences Université Joseph Fourier, *Grenoble, France* 2008
B.Sc., Geology, Ecole Normale Supérieure, *Lyon, France* 2006

Appointments

Air Monitoring Specialist, *Puget Sound Clean Air Agency, Seattle, USA* 2019 – present
Postdoctoral Associate, *Rutgers University, USA* 2018 – 2019
Visiting Postdoctoral Associate, *Earth and Space Sciences, Univ. of Washington, USA* 2015 – 2019
Postdoctoral Associate, *Univ. of Utah, USA* 2015 – 2018
NASA Graduate Research Fellow, *Univ. of Utah, USA* 2010 – 2015
Chateaubriand Visiting Scholar, *Centre d'Etude de la Neige (CEN), France* *09*/2012 – 02/2013
Graduate Research and Field Assistant, *IRD, Quito, Ecuador* 05/2007 – 08/2007

Dissemination of Results

To date, I co-authored **27** research articles in peer-review journals in topics related to snow accumulation, melt, and climate in polar environments, geophysics of the cryosphere and radio-glaciology. Please visit *orcid.org/0000-0002-1894-3723* for publication details.
I have given more than **20** presentations at national and international conferences including **5** invited presentations to disseminate research to various communities of interest.
My current outreach actions are made of training school teachers, focus communities, and general public on air quality (basics, awareness and relevance), associated data (availability, access and manipulation) and low-cost air-quality sensors. Previous outreach actions while working in the snow-science community included blog entries on NASA Earth Observatory website and guest presentations in classrooms from elementary to high school.

Additional Experience

Fieldwork: Since 2019, I have been involved in performing routine maintenance on air quality equipment during weekly site visits across the Puget Sound region (WA). For 2010-2018, I contributed to 13 polar research expeditions and 4 mountain-glacier expeditions worldwide.
Proposal writing: I contributed to writing 10 proposals including 4 as lead/co-lead which generated $1.8M of research funds mainly from NSF Polar Programs, NASA ROSES and EPA
Professional service: scientific reviewer for *Frontiers in Earth Sciences, Remote Sensing MDPI, Journal of Geophysical Research, Journal and Annals of Glaciology*

ADAM PETRUSKY
Air Monitoring Specialist
Special Projects Coordinator

adamp@pscleanair.org
Ex. 6 Personal Privacy (PP)

PROFESSIONAL EXPERIENCE

AIR MONITORING SPECIALIST II/SPECIAL PROJECTS COORDINATOR
PUGET SOUND CLEAN AIR, 08.2014 - Present

Responsible for correcting problems with the Agency's air monitoring equipment and data network; teaching monitoring staff about troubleshooting procedures and best practices; researching new low-cost air monitoring technologies; coordinating monitoring projects with highly impacted communities, the Agency's Environmental Justice coordinator, and others; coordinating logistics of new modes of data collection in mobile and/or small footprint settings.

AIR MONITORING SPECIALIST
PUGET SOUND CLEAN AIR, 04.2006 - 09.2010 and 12.2011 - 07.2014

Responsible for the care of the Agency's air monitoring network; traced and corrected faults in equipment; networked remote sites together; fixed roof leaks; taught monitoring staff about troubleshooting procedures and best practices; researched, fabricated, and evaluated small, portable air monitors; represented the Agency in various external forums.

TEMPORARY AIR MONITORING LEAD
PUGET SOUND CLEAN AIR, 10.2010 - 11.2011; 07.2019 - 07.2020

Responsible for the operation of the Agency's air monitoring network; tracked staff capacity and provided timely feedback to Manager of Technical Analysis and employees; coordinated monitoring activities with other agencies and organizations; led tours of monitoring sites and the Tacoma-Pierce County Smoke Reduction Zone.

AIR QUALITY SPECIALIST
AMTEST AIR QUALITY, 06.2000 - 03.2006

Led stationary source testing filed teams throughout the country; fabricated and/or maintained field equipment; trained new employees on testing procedures and methodologies; kept contact with clients, consultants, and regulatory personnel.

EDUCATION

UNIVERSITY OF WASHINGTON, SEATTLE, B.S. FOREST RESOURCE MANAGEMENT

Landon Bosisio

Communications Specialist

1904 Third Avenue, Suite 105, Seattle, WA 98101
Ex. 6 Personal Privacy (PP) landonb@pscleanair.org

EDUCATION

Master of Public Administration June 2011
University of Washington (UW), Evans School, Seattle, WA GPA: 3.7/4.0

Bachelor of Arts in History, Minor in Biology May 2009
Northwest Missouri State University (NWMSU), Maryville, MO GPA: 3.9/4.0

RELEVANT WORK EXPERIENCE

Puget Sound Clean Air Agency, Seattle, WA August 2014 – Present
Communications Specialist

- Plan, implement and manage education, awareness, and outreach programs related to the Agency's transportation, burn ban, and environmental justice goals
- Consult with agency staff and external partners individually and as part of work teams to identify communication needs and apply appropriate strategies
- Research, write and produce print and electronic communication materials
- Educate local residents and community groups through various communication methods, including presentations at community gatherings and providing an agency presence at local events
- Communicate technical and policy information clearly to a variety of audiences

EnviroIssues, Seattle, WA September 2011 – August 2014
Associate

- Provided outreach and communications support for the planning and implementation of public projects, including seawall replacement, stormwater infrastructure, and policy development
- Drafted, edit and produce public information materials, including newsletters, mailers, posters, flyers, press releases, web content and social media messages
- Developed community relations plan for construction projects in residential neighborhoods, including stakeholder mapping, developing key messages, and coordinating outreach strategies
- Conducted public outreach to businesses and residents during project construction activities, including site visits, email responses, and answering a 24-hour hotline
- Drafted and developed weekly email construction updates for over 1,600 recipients
- Planned and coordinated over 40 open houses, community meetings, and public briefings
- Represented clients at over 35 events to provide in-person outreach to the public
- Produced a final report highlighting a stakeholder committee's recommendations for a new unreinforced masonry building policy for the Seattle City Council

City of Seattle, Dept. of Planning and Development, Seattle, WA August 2010-June 2011
City Green Building Intern/Policy Evaluation Consultant

- Developed an implementation and evaluation plan for the update of the City's Sustainable Building Policy to increase the energy efficiency of the City's building stock
- Provided policy research and administrative support to the Sustainable Building Policy on topics such as LEED certification within both the public and private sectors
- Researched and developed monthly newsletter for 1000+ subscribers on green building announcements, conferences, and learning opportunities
- Developed and distributed program resource and outreach materials to educate general public on the City's environmental and energy efficiency program

Joanna Gangi, LEED AP

Equity and Community Engagement Communications Specialist

Summary of Qualifications:

- 15 years of experience planning multiple communications and marketing strategies, executing brand awareness campaigns, and designing various communications platforms for the sustainability industry with an equity focus.
- Experience with community engagement strategies, mostly in disproportionately impacted communities
- Extensive experience developing pro-equity and environmental justice communications
- Skilled at writing and designing technical reports that are digestible for a non-technical audience

Education:

Indiana University
(2002 - 2003)
Graduate work through overseas program. Participant observation of South Pacific educational cultures in New Zealand.

Ball State University
(1998 - 2002)
B.S. in History & Secondary Education, Minor in Anthropology

Work Experience:

2018 – Current: Puget Sound Clean Air Agency

Equity and Community Engagement Communications Specialist

- Run communications for the equity and community engagement department to create awareness about air quality and environmental justice.
- Coordinate work in Agency's four environmental justice communities.
- Direct the messaging, collateral design, and social media of the department.
- Led the brand evolution project for the entire Agency.
- Execute on internal staff training opportunities to promote equity.
- Lead internal staff racial caucusing for staff that identify as white.
- Direct and launched internal staff equity newsletter in the first two months resulting in 90% open rate.

2014 – 2018: International Living Future Institute

Communications Director

- Oversaw communications department, social media, public relations, marketing, and Trim Tab, a quarterly magazine and weekly blog.
- Directed the writing, messaging, and design of all collateral, websites, and publications.

- Directed the design, development and launch of the ILFI's three mobile applications, designed for iOS, Android and mobile website platforms.
- Directed the redesign of the ILFI's website from Drupal based platform to customized WordPress.
- Led the ILFI's equity and diversity work.
- Since 2016, grew email subscribers by 35% and social media audience by 72%.

2008 – 2014: International Living Future Institute

Editorial Director + Communications Coordinator

- Managed the creation, design and production of Trim Tab, a quarterly magazine (digital and print).
- Directed the digital redesign of the magazine resulting in a 30% increase in web views.
- Planned, coordinated, and implemented all public information, including communications and marketing plan, and community awareness activities.
- Coordinated annual conferences that promoted resilient and healthy design principles in the built environment.

2005 – 2014: Noland Homes

Marketing Specialist + Customer Relations Specialist

- Assisted in sales and marketing responsibilities including closing purchase and sale agreements, executing buyer close-out process, and managing final stages of construction phase.
- Managed homeowner quality control department resulting in 98% customer satisfaction rating.
- Managed development of company mySQL database.

2004 – 2005: Kid's Club

Lead Teacher

- Managed after school program for grades k - 5.
- Supervised all program activities, developed curriculum and themed units, and lead staff development.

Agency Publications:

Air Toxics Study in the Chinatown – International District (2018)
- Wrote and designed community report version of the full report
- https://pscleanair.gov/DocumentCenter/View/3399/Air-Toxics-Study-in-the-Chinatown-International-District-Community-Report

Community Engagement Blogs:

Editorial Director for Agency Community Engagement Blog
- https://pscleanair.gov/513/Community-Blog

Saba Rahman

Equity & Engagement Specialist

1904 3rd Ave, Suite 105 Seattle, WA 98101 | Ex. 6 Personal Privacy (PP) | SabaR@pscleanair.gov

SKILLS

- Program Evaluation
- Policy Analysis
- Community Engagement
- Inclusive Communication
- Project Management
- Effective Collaboration

EDUCATION

Master of Public Administration (MPA) **June 2020**

University of Washington – Evans School of Public Policy & Governance, Seattle
Focuses in Environmental Policy and Management & Public Finance

B.S. Environmental Science and Policy **May 2016**

University of Maryland, College Park

RELEVANT EXPERIENCE

Equity & Engagement Specialist ***May* 2021 – Present**

Puget Sound Clean Air Agency | Seattle, WA

- Coordinate Focus Community program that aims to mitigate the impact of air pollution on communities that are disproportionately impacted in the region and expand awareness of associated health impacts.
- Developing relationships and partnerships with community leaders and community-based organizations to collaboratively address environmental injustices in the region.
- Guiding and collaborating with the internal engagement teams to achieve the Agency's equity goals.
- Developing and implementing community engagement plans for various Agency programs and policies to better integrate environmental justice principles and community input across the Agency.
- Support and coordinate internal equity education opportunities for staff to promote foundational equity and justice knowledge.

Climate Engagement and Preparedness Coordinator **May 2019 – April 2021**

King County Department of Natural Resources and Parks | Seattle, WA

- Cultivated community partnerships and executed equitable community engagement surrounding the 2020 update of King County's Strategic Climate Action Plan (SCAP).
- Applied a community-driven approach to development of climate policies around climate equity and environmental justice in King County's Strategic Climate Action Plan (SCAP).
- Developed strategic plans to engage community members through inclusive and culturally relevant materials, workshops, educational opportunities, newsletters, website updates, and social media.

Consultant **December 2019 – June 2020**

Washington Department of Ecology | Seattle, WA

- Performed research, including interviews, on models of environmental justice policymaking across sectors that can be applied to the Department of Ecology's programs and policies.
- Provided recommendations and guidance on integrating an equity and/or environmental justice lens to the departments program development practices in partnership with WA state's Environmental Justice Task Force.

NAME: Austin, Elena

eRA COMMONS USER NAME (credential, e.g., agency login): elenaaustin

POSITION TITLE: Asistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
McGill University, Montreal, Quebec	BS	05/2002	Joint major in Mathematics and Physiology
Conservatoire de Musique du Quebec, Quebec	BOTH	05/2004	Violin Performance
Mannes Conservatory of Music, New York, NY	MOTH	05/2006	Violin Performance
New York University, New York, NY	MS	11/2008	Environmental Health
Harvard School of Public Health, Boston, MA	DSC	11/2013	Environmental Health
University of Washington, Seattle, WA	NIH training grant	11/2015	Training in Biostatistics and Environmental Health

A. Personal Statement

I am currently an Assistant Professor in the Department of Environmental and Occupational Health Sciences at the University of Washington School of Public Health. I have a background in exposure assessment and epidemiology as well as strong statistical skills. My expertise areas and past work include complex multi-pollutant exposure metrics, geographic information systems, remote sensing, risk communication in rural and development and evaluation real-time community air pollution decisions tools. I teach undergraduate course in Community Air Pollution, Industrial Hazards and Quantitative Exposure Assessment. I also have strong experience in sampling indoor and outdoor ultrafine particles with the goal of developing multi-pollutant exposure metrics to identify unique sources and health impacts on communities. As principal investigator of two different projects evaluating the impact on exposure and health of indoor air quality interventions, including HEPA filter deployments. I also lead an EPA project to better characterize the benefits of wildfire interventions to improve indoor air quality. I have participated in several community-engaged environmental monitoring studies, including projects along the US-Mexico border region. Empowering communities to learn, discuss and evaluate environmental health burden, impacts and solutions through qualitative and quantitative methods is an important research interest of mine. I currently serve on Agricultural Workshop Planning Committee Member of the National Academy of Science providing expertise on environmental health communication. I have previously had the opportunity to collaborate with Dr. Seto, including addressing air pollution concerns including wildfire smoke with the Yakama Nation in central Washington. On this project I plan to advise and guide air pollution data collection and exposure assessment interpretation:

1. Austin E, Xiang J, Gould TR, Shirai JH, Yun S, Yost MG, Larson TV, Seto E. Distinct ultrafine particle profiles associated with aircraft and roadway traffic. Environmental science & technology. 2021 Feb 5;55(5):2847-58.
2. Stampfer O, Austin E, Ganuelas T, Fiander T, Seto E, Karr C. Use of low-cost PM monitors and a multi-wavelength aethalometer to characterize PM2. 5 in the Yakama Nation reservation. Atmospheric Environment. 2020 January 20; 224(1):117292.
3. Austin E, Novosselov I, Seto E, Yost MG. Laboratory Evaluation of the Shinyei PPD42NS Low-Cost Particulate Matter Sensor. PLoS One. 2015;10(9):e0137789. PubMed PMID: 26367264; PubMed Central PMCID: PMC4569398.
4. Austin E, Coull B, Thomas D, Koutrakis P. A framework for identifying distinct multipollutant profiles in air pollution data. Environ Int. 2012 Sep 15;45:112-21. PubMed PMID: 22584082; PubMed Central PMCID: PMC3774277.

B. Positions and Honors

2006 - 2008	Research Assistant, New York University, Department of Environmental Health
2008	Roadmap Fellowship, National Institutes of Health
2008 - 2013	Research Assistant, Harvard School of Public Health, Department of Environmental Health
2013 -2015	Senior Fellow Trainee, Biostatistics Training (BEBTEH), University of Washington
2016 - 2020	Research Scientist, University of Washington, Seattle, WA
2020 -	Assistant Professor, University of Washington, DEOHS, Seattle, WA
2009 -	Member, International Society of Exposure Science
2013 -	Peer Reviewer, Environmental Health Perspectives, Environment International, PLOS ONE, Journal of Agromedicine
2014 -	Member, International Society for Environmental Epidemiology
2020 -	Agricultural Workshop Planning Committee Member, National Academy of Science

C. Contribution to Science: Selected studies on air quality measurement, multipollutant data modeling, environmental health communication and indoor air quality interventions.

1. Carmona N, Seto E, Gould T, Shirai JH, Hayward L, Cummings BJ, Larson T, Austin E. Indoor Air Quality Intervention in Schools; Effectiveness of a Portable HEPA Filter Deployment in Five Schools Impacted by Roadway and Aircraft Pollution Sources. medRxiv. 2022 Jan 1.
2. Zuidema, C., Schumacher, C. S., Austin, E., Carvlin, G., Larson, T. V., Spalt, E. W., ... Others. (2021). Deployment, Calibration, and Cross-Validation of Low-Cost Electrochemical Sensors for Carbon Monoxide, Nitrogen Oxides, and Ozone for an Epidemiological Study. Sensors, 21(12), 4214.
3. Liu, Yisi, Austin, E., Xiang, J., Gould, T., Larson, T., & Seto, E. (2021b). Health impact assessment of the 2020 Washington State wildfire smoke episode: Excess health burden attributable to increased PM2. 5 exposures and potential exposure reductions. GeoHealth, 5(5), e2020GH000359.
4. Zusman M, Schumacher CS, Gassett AJ, Spalt EW, Austin E, Larson TV, Carvlin G, Seto E, Kaufman JD, Sheppard L. Calibration of low-cost particulate matter sensors: Model development for a multi-city epidemiological study. Environ Int. 2020 Jan;134:105329. PubMed PMID: 31783241; PubMed Central PMCID: PMC7363217
5. VanDerGeest K, Ko LK, Karr C, Torres E, Drury D, Austin E. Private well stewardship within a rural, agricultural Latino community: a qualitative study. BMC Public Health. 2020 Jun 5;20(1):863. PubMed PMID: 32503551; PubMed Central PMCID: PMC7275588.
6. Stampfer O, Austin E, Ganuelas T, Fiander T, Seto E, Karr C. Use of low-cost PM monitors and a multi-wavelength aethalometer to characterize PM2. 5 in the Yakama Nation reservation. Atmospheric Environment. 2020 January 20; 224(1):117292.
7. Liu Y, Lan B, Shirai J, Austin E, Yang C, Seto E. Exposures to Air Pollution and Noise from Multi-Modal Commuting in a Chinese City. Int J Environ Res Public Health. 2019 Jul 16;16(14)PubMed PMID: 31315275; PubMed Central PMCID: PMC6679126.
8. Seto E, Carvlin G, Austin E, Shirai J, Bejarano E, Lugo H, Olmedo L, Calderas A, Jerrett M, King G, Meltzer D, Wilkie A, Wong M, English P. Next-Generation Community Air Quality Sensors for Identifying Air Pollution Episodes. Int J Environ Res Public Health. 2019 Sep 5;16(18)PubMed PMID: 31492020; PubMed Central PMCID: PMC6774374.
9. Blanco MN, Fenske RA, Kasner EJ, Yost MG, Seto E, Austin E. Real-time particle monitoring of pesticide drift from an axial fan airblast orchard sprayer. J Expo Sci Environ Epidemiol. 2019 Apr;29(3):397-405. PubMed PMID: 30425317; PubMed Central PMCID: PMC6469994.
10. Xiang J, Austin E, Gould T, Larson T, Shirai J, Liu Y, Marshall J, Seto E. Impacts of the COVID-19 responses on traffic-related air pollution in a Northwestern US city. Sci Total Environ. 2020 Dec 10;747:141325. PubMed PMID: 32771792; PubMed Central PMCID: PMC7386255.
11. Austin E, Coull B, Thomas D, Koutrakis P. A framework for identifying distinct multipollutant profiles in air pollution data. Environ Int. 2012 Sep 15;45:112-21. PubMed PMID: 22584082; PubMed Central PMCID: PMC3774277.
12. Zanobetti A, Austin E, Coull BA, Schwartz J, Koutrakis P. Health effects of multi-pollutant profiles. Environ Int. 2014 Oct;71:13-9. PubMed PMID: 24950160; PubMed Central PMCID: PMC4383187.
13. Austin E, Coull BA, Zanobetti A, Koutrakis P. A framework to spatially cluster air pollution monitoring sites in US based on the PM2.5 composition. Environ Int. 2013 Sep;59:244-54. PubMed PMID: 23850585; PubMed Central PMCID: PMC3878877.

https://www.ncbi.nlm.nih.gov/myncbi/elena.austin.1/bibliography/public/

NAME: Edmund Seto

eRA COMMONS USER NAME (credential, e.g., agency login): edseto

POSITION TITLE: Associate Professor

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of California, Berkeley	A.B.	12/1993	Computer Science
University of California, Berkeley	M.S.	05/1995	Environmental Health Sciences
University of California, Berkeley	Ph.D.	05/2000	Environmental Health Sciences

A. Personal Statement

I will serve as Co-I for this enhanced air quality monitoring for communities grant, and will work collaboratively with the Puget Sound Clean Air Agency (PSCAA) and community partners to analyze air quality data collected using the TREE trailer and its branching mobile sensors to address questions raised by communities related to the temporal patterns and spatial variations of pollutants, sources that may potentially explain pollutant mixtures, and potential health impacts related to pollutant exposures. I am an Associate Professor in the Exposure Sciences Group in the Department of Environmental and Occupational Health Sciences at the University of Washington School of Public Health, and Deputy Director of the UW NIEHS P30 Center for Exposures, Diseases, Genomics and Environment (EDGE). My education and training are in Computer Science and Environmental Health Sciences. My expertise is in Exposure Science, especially in the areas of development, evaluation and applications of novel air quality instruments, personal exposure assessment, environmental justice issues and community-engaged research, and spatial-temporal exposure assessment and modeling. I teach undergraduate and graduate courses in GIS in Public Health, and worked in collaboration with community partners and state/regional agencies to develop the WA Environmental Health Disparities Map -- an online interactive cumulative impacts assessment tool for climate and environmental justice policy for the state. I have expertise in air quality exposure measurements and assessment methods, have previously taught the graduate-level Industrial Hygiene sampling methods at UW, and have served as PI and Co-Inv on community-engaged research air quality studies, such as the NIH Research-to-Action study in the Imperial Valley, which developed and deployed 40 low-cost community air monitoring sites, and led to the passage of AB617, allowing for similar community monitoring programs to be support by CalEPA's cap and trade funds. I also serve as PI and Co-Inv on a number of NIH, US EPA, and CalEPA studies involving novel exposure methods, including studies of asthma, systemic inflammation, and Alzheimer's Disease. Most recently, I have conducted studies related to wildfire smoke and indoor air quality and the efficacy of portable air cleaners, and served on the US EPA's Children's Health and Wildfire Smoke Workshop. Throughout many of these projects, I have worked collaboratively with a variety of stakeholders to promote the policy relevance of research. Four related papers are:

1. Min, E., Gruen, D., Banerjee, D., Echeverria, T., Freelander, L., Schmeltz, M., Saganić, E., Piazza, M., Galaviz, V.E., Yost, M., Seto, E.Y.W. (2019) The Washington State Environmental Health Disparities Map: Development of a Community-Responsive Cumulative Impacts Assessment Tool. Int. J. Environ. Res. Public Health, 16(22), 4470. doi:10.3390/ijerph16224470
2. Austin, E., Xiang, J., Gould, T., Shirai, J., Yun, S., Yost, M.G., Larson, T., Seto, E., (2021) Distinct ultrafine particle profiles associated with aircraft and traffic, Environ. Sci. Technol., 55, 5, 2847–2858.
3. Seto E, Carvlin G, Austin E, Shirai J, Bejarano E, Lugo H, Olmedo L, Calderas A, Jerrett M, King G, Meltzer D, Wilkie A, Wong M, English P. (2019) Next-Generation Community Air Quality Sensors for Identifying Air Pollution Episodes. Int J Environ Res Public Health. 16(18). E3268. PMCID: PMC6774374

4. Liu, Y., Austin, E., Xiang, J., Gould, T., Larson, T., Seto, E. (2021) Health Impact Assessment of the 2020 Washington State Wildfire Smoke Episode: Excess Health Burden Attributed to Increased PM2.5 Exposures and Potential Exposure Reductions, GeoHealth, doi:10.1029/2020GH000359

B. Positions and Honors

1993-1996	Graduate Student Researcher, Robert Spear, School of Public Health, UC Berkeley
1994-1996	Research Consultant, Water pathogen risk assessment, EOA, Inc.
1996-1997	Graduate Student Researcher, Mark Nicas, School of Public Health, UC Berkeley
1997-2000	Graduate Student Researcher, Robert Spear, School of Public Health, UC Berkeley
1999-2001	Research Consultant, Water pathogen risk assessment, EOA, Inc.
2000-2006	Assistant Researcher, School of Public Health, University of California, Berkeley
2003-2005	Lecturer in Geographic Information Systems, School of Public Health, UC Berkeley
2004	Visiting Scholar, Schistosomiasis Control Initiative, Imperial College, London
2006-2009	Lecturer in Health Impact Assessment, School of Public Health, UC Berkeley
2006-2009	Associate Researcher, School of Public Health, University of California, Berkeley
2009-2013	Associate Adjunct Professor, School of Public Health, University of California, Berkeley
2011-	Associate Faculty Director, Center for I. T. Research in the Interest of Society (CITRIS)
2013-	Associate Professor, Environmental and Occupational Health Sciences, Univ of Wash.
2016-	Co-Director, Exposure Core (EABES-FC), NIEHS EDGE Center at the Univ of Wash.
2019-	Deputy Director, NIEHS EDGE Center at the University of Washington

B. Contributions to Science

Other selected papers on air quality exposure, indoor air quality interventions, community-engaged research:

1. Min, E., Piazza, M., Galaviz, V., Saganić, E., Schmeltz, M., Freelander, L., Farquhar, S.A., Karr C.J., Gruen, D., Banerjee, D., Yost, M., Seto, E.Y.W. (2021), Quantifying the Distribution of Environmental Health Disparities in Washington State with the Cumulative Environmental Inequality Index, Environmental Justice, 14(4), 298-314. doi:10.1089/env.2021.0021
2. Seto E, Min E, Ingram C, Cummings BJ, Farquhar SA. (2020) Community-Level Factors Associated with COVID-19 Cases and Testing Equity in King County, Washington. Int J Environ Res Public Health. 2020 Dec 18;17(24):9516. doi: 10.3390/ijerph17249516.PMID: 33353095
3. Austin, E. Kasner, E, Seto, E, Spector, J (2020) Combined Burden of Heat and Particulate Matter Air Quality in WA Agriculture, J Agromedicine, 1-10. doi: 10.1080/1059924X.2020.1795032
4. English, P., Amato, H., Bejarano, E., Carvlin, G., Lugo, H., Jerrett, M., King, G., Madrigal, D., Meltzer, D., Northcross, A., Olmedo, L., Seto, E., Torres, C., Wilkie, A., Wong, M. (2020) Performance of a Low-Cost Sensor Community Air Monitoring Network in Imperial County, CA. Sensors, 20, 3031.
5. Huang, C-H, Xiang, J, Austin, E, Shirai, J, Liu, Y, Simpson, C, Karr, C, Fyfe-Johnson, AL, Larsen, TK, Seto, E (2020) Impacts of using auto-mode portable air cleaner on indoor PM2.5 levels: An intervention study, Building and Environment, 107444. doi: 10.1016/j.buildenv.2020.107444
6. Stampfer. O, Austin, E, Ganuelas; T, Fiander, T, Seto, E, Karr, C (2020) Use of low-cost PM monitors and a multi-wavelength aethalometer to characterize PM2.5 on the Yakama Nation Reservation, Atmospheric Environment, 224, 117292. doi:10.1016/j.atmosenv.2020.117292
7. Zusman, M., Schumacher, C.S., Gassett, A.J., Spalt, E.W., Austin, E., Larson, T.V., Carvlin, G., Seto, E., Kaufman, J.D., Sheppard, L. (2020), Calibration of low-cost particulate matter sensors: Model development for a multi-city epidemiological study, Environment International, 134, 105329.
8. English, P., Amato, H., Bejarano, E., Carvlin, G., Lugo, H., Jerrett, M., King, G., Madrigal, D., Meltzer, D., Northcross, A., Olmedo, L., Seto, E., Torres, C., Wilkie, A., Wong, M. (2020) Performance of a Low-Cost Sensor Community Air Monitoring Network in Imperial County, CA. Sensors, 20, (11), 3031.
9. Nieuwenhuijsen MJ, Donaire-Gonzalez D, Rivas I, de Castro M, Cirach M, Hoek G, Seto E, Jerrett M, Sunyer J. (2015) Variability in and agreement between modeled and personal continuously measured black carbon levels using novel smartphone and sensor technologies. Environ Sci Technol. 49(5):2977-82.

Full bibliography:
https://pubmed.ncbi.nlm.nih.gov/?term=Seto%2C%20Edmund%5BFull%20Author%20Name

NEGOTIATED INDIRECT COST RATE AGREEMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
COGNIZANT AGENCY
NEGOTIATION AGREEMENT

Puget Sound Clean Air Agency
Seattle, WA

Date: October 4, 2017
Filing Ref: August 5, 2017

The indirect cost rates contained herein are for use on grants and contracts with the Federal Government to which Office of Management and Budget Circular 2 CFR Part 200 applies, subject to the limitations contained in the Circular and in Section II, A below.

SECTION I: RATES

Type	Effective Period From	To	Rate	Base
Fixed:				
Indirect Costs	7/1/2017	6/30/2018	65.29%	(a)

Basis for Application
(a) Direct salaries and wages and fringe benefits.

Treatment of Fringe Benefits: Fringe benefits applicable to direct salaries and wages are treated as direct costs.

SECTION II: GENERAL

A. LIMITATIONS: The rates in this Agreement are subject to any statutory and administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the department/agency or allocated to the department/agency by an approved cost allocation plan were included in the indirect cost pool as finally accepted; such costs are legal obligations of the department/agency and are allowable under governing cost principles; (2) The same costs that have been treated as indirect costs have not been claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the department/agency which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. CHANGES. The fixed rate contained in this agreement is based on the organizational structure and the accounting system in effect at

the time the proposal was submitted. Changes in the organizational structure or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rate in this agreement, require the prior approval of the authorized representative of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowances.

C. THE FIXED RATE contained in this agreement is based on an estimate of the cost which will be incurred during the period for which the rate applies. When the actual costs for such a period have been determined, an adjustment will be made in the negotiation following such determination to compensate for the difference between the cost used to establish the fixed rate and that which would have been used were the actual costs known at the time.

D. NOTIFICATION TO FEDERAL AGENCIES: Copies of this document may be provided to other Federal agencies as a means of notifying them of the agreement contained herein.

E. SPECIAL REMARKS: Please confirm your acceptance of the terms of the indirect cost rate agreement by signing and returning this letter to me. Please retain a copy for your records.

ACCEPTANCE

The undersigned official warrants that he/she has the proper authority to execute this agreement on the behalf of the State Agency:

(Signature)

Andrew Green
(Name)

Director, Air Programs
(Title)

Puget Sound Clean Air Agency
(Agency)

10/4/2017
(Date)

By the Federal Agency:

Jacqueline Smith
(Signature)

Jacqueline Smith, Rate Negotiator
Financial Analysis and
Oversight Service Center
U.S. Environmental
Protection Agency

Negotiated by: Jacqueline Smith
Telephone: (202) 564-5055

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

COGNIZANT AGENCY
NEGOTIATION AGREEMENT

Puget Sound Clean Air Agency
Seattle, WA

Date: July 16, 2021
Filing Ref: September 8, 2020

The indirect cost rates contained herein are for use on grants and contracts with the Federal Government to which Office of Management and Budget Circular 2 CFR Part 200 applies, subject to the limitations contained in the Circular and in Section II, A below.

SECTION I: RATES

Type	Effective Period From	To	Rate	Base
Fixed:				
Indirect Costs	7/1/2021	6/30/2022	68.98%	(a)

Basis for Application
(a) Direct salaries and wages and fringe benefits.

Treatment of Fringe Benefits: Fringe benefits applicable to direct salaries and wages are treated as direct costs.

SECTION II: GENERAL

A. LIMITATIONS: The rates in this Agreement are subject to any statutory and administrative limitations and apply to a given grant, contract or other agreement only to the extent that funds are available. Acceptance of the rates is subject to the following conditions: (1) Only costs incurred by the department/agency or allocated to the department/agency by an approved cost allocation plan were included in the indirect cost pool as finally accepted; such costs are legal obligations of the department/agency and are allowable under governing cost principles; (2) The same costs that have been treated as indirect costs have not been claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the department/agency which was used to establish the rates is not later found to be materially incomplete or inaccurate by the Federal Government. In such situations the rate(s) would be subject to renegotiation at the discretion of the Federal Government.

B. CHANGES. The fixed rate contained in this agreement is based on the organizational structure and the accounting system in effect at

the time the proposal was submitted. Changes in the organizational structure or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rate in this agreement, require the prior approval of the authorized representative of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowances.

C. THE FIXED RATE contained in this agreement is based on an estimate of the cost which will be incurred during the period for which the rate applies. When the actual costs for such a period have been determined, an adjustment will be made in the negotiation following such determination to compensate for the difference between the cost used to establish the fixed rate and that which would have been used were the actual costs known at the time.

D. NOTIFICATION TO FEDERAL AGENCIES: Copies of this document may be provided to other Federal agencies as a means of notifying them of the agreement contained herein.

E. SPECIAL REMARKS: Please confirm your acceptance of the terms of the indirect cost rate agreement by signing and returning this letter to me. Please retain a copy for your records.

ACCEPTANCE

The undersigned official warrants that he/she has the proper authority to execute this agreement on the behalf of the State Agency:

(Signature)

Craig Kenworthy
(Name)

Executive Director
(Title)

Puget Sound Clean Air Agency
(Agency)

7/19/2021
(Date)

By the Federal Agency:

Jacqueline Smith
(Signature)

National Policy, Training and Compliance Division
U.S. Environmental Protection Agency

Negotiated by: Jacqueline Smith
Telephone: (202) 564-5055

STATEMENT ON QUALITY ASSURANCE

The Puget Sound Clean Air Agency strives to gather and interpret data in a rigorous, transparent, and ethical manner to ensure it is of the highest quality and to produce sound and careful analysis. Adam Petrusky will be assigned to ensure quality assurance and control on this project. He has been an Air Monitoring Specialist at the Agency for sixteen years and has overseen numerous projects in this capacity. He is responsible for maintenance and oversight of the Agency's ambient air monitoring network, in addition to the quality assurance and submittal of the data collected in the network. He has vast experience in rigorous quality assurance, which is especially necessary for validating regulatory data.

The Agency is committed to providing the highest degree of data quality to meet the monitoring objectives of this project. Upon initiating this project, we will develop data quality objectives for each component of the monitoring data and implement these objectives in a Quality Assurance Project Plan (QAPP) to be written before the start of microsensor data collection. Routine quality control checks will be applied to all incoming data that is placed in the data repository. Technical procedures for the quality assurance program will be described in the QAPP and will include routine calibrations, annual system audits, standard checks, system blanks, record keeping checks and exception logging. Our data quality objectives include maintaining 75% data completeness for all grid and fixed site analyses. Other objectives are discussed per instrument in the following section.

The quality assurance (QA) for this proposed work will consist of two main monitoring components: QA procedures for fixed-site monitoring, and for the use of micro-sensors (for BC, CO, NO, particle counts) for community-directed monitoring. All FEM, FRM, or PM2.5 Speciation/CSN (if applicable) instruments will operate continuously and conform to the applicable Washington State Department of Ecology (DOE) Standard Operating Procedures (SOP) for each instrument used. The Agency will not be creating new QA methods beyond already established practices. For mobile sensors, calibrations will be conducted as in prior studies using calibration methods and instruments used in the UW's EPA-funded Center for Clean Air Research (CCAR) using the FEM or equivalent instrument in the trailer as a reference standard.

We will be conducting the routine calibrations, audits, and quality control steps required for each instrument. They will include standard audit such as as-found/as-left leak and flow checks for all instruments using sample pumps. Air flow will be checked using a NIST traceable calibrated flow device biweekly or monthly based on the sampling frequency. We aim to have at least 75% of data completeness for all sampling, at fixed sites during the year of sampling, and also in the sampling efforts done in tandem with the community. All the data generated from the audits will be compiled to gain transparency and reproducibility for later use. Any data flagging or invalidation from our data analyst will also be included in the metadata product along with the reason for flagging/invalidating. Routine quality control checks will be applied to all incoming data that is placed in the data repository. Technical procedures for the quality assurance program will be described in the QAPP and will include routine audit checks and calibrations, annual system audits, standard checks, system blanks, record keeping checks and exception logging.

The trailer (hub) will have the following instruments: FEM MetOne BAM $PM_{2.5}$, Ecotech nephelometer, Magee Scientific Aethalometer, total ultrafine particle counter, carbon dioxide sensor, and meteorological instruments.

The community-led walking tours will include a suite of hand-held sensors like microAeth, AirBeams, Dylos, total VOC analyzer, and Enmont ultrafine particle counter.

All FEM instruments will operate continuously and conform to the applicable Washington State Department of Ecology (ECY) SOPs for each instrument used. Since neither the Agency nor Washington State ECY has a SOP for these smaller sensors, we will develop general bias and precision benchmarks before and after sampling to ensure data quality. An analyst will review data on a weekly basis and a deviation of more than 30% will cause the sensors to be flagged for investigation. If upon investigation any uncorrectable problems or deficiencies are found, the sensor will be replaced with a fully functional, newly calibrated one. Data will be invalidated back to the last available quality assurance check or calibration if a sensor is found faulty.

We may use forms of secondary data not limited to traffic volume by vehicle type, road length, train hauling volume, census primary wood burning data, census populations, household counts, parcel locations with identified "fireplaces," industrial land area or density, meteorological data, or other metrics that could be included in a land use regression model. The sources of this data include reliable and quality assured resources including the Census Bureau, King County, the Washington State Department of Transportation, the National Weather Service, and Agency records.

An analyst will review freshly collected data on a weekly basis. For all data being fed to our database near real-time, we plan to run an automated script once a day to inform us (via email) if a given sensor is experiencing malfunction and needs immediate attention. The instruments with established procedures will follow the current protocols for validation. For those without procedures, any portable sensors found to be more than 50% off from an average of the other sensors will be flagged for investigation. In addition, we plan to remove the portable sensors from the study area and collocate them with FRM or FEM monitors for 24-72 hours once a month. We plan to flag any portable sensors with more than 30% difference in average from the reference monitor and report any instrument temporal drift. We will replace any faulty portable sensor with a new one after a calibration phase.

Data resolution will play an important factor in determining if the data can be included in the analysis. Some estimates like distance to roadways using GIS will be high resolution. Meanwhile traffic volume may be limited to the nearest traffic counter. As a result, different inputs can have different effects dependent on the spatial resolution of the model. We could employ leave-one-out or K-fold cross-validation in any land-use regression to better understand each variable and understand the limitations based on its respective resolution or other features.

We will use chain of custody forms to track the location of equipment, including microsensors. We will also maintain electronic logs of changes to systems including databases and invalidations. We will also keep track of equipment with Agency tags and follow regular site audits according to Agency policies and procedures.

No new air pollution models will be developed for this study. GIS-based modeling approaches, including those using spatial smoothing (kriging and inverse distance weighting) and land use regression modeling have been well established and are described in scientific peer-reviewed literature. The Agency will also not create new environmental technologies but will assemble current components to create sensors that can log data and can track coordinates and time.

LETTERS OF SUPPORT

3/21/22

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Mrs. Wang,

The King County International Airport Community Coalition would like to express support for the Puget Sound Clean Air Agencies (PSCAA) proposal for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks in the Georgetown, South Park, Allentown, Tukwila, Beacon Hill, and Duwamish communities which are disproportionately impacted by air pollution in the region. Learn more about us and our partners here.

PSCAA has shown a commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand this work and meet the requests of our communities.

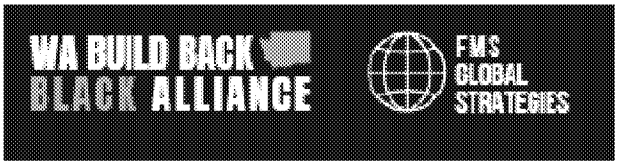
This proposal will help to empower community members to lead their own data gathering and learning. This project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

We look forward to collaboratively working with PSCAA on gathering community input on sampling locations and pollutants of concern for designing the study and collecting data with community members. We will also work with PSCAA and community members on identifying next steps based on the results of this study. Partnering with PSCAA on this project will allow the community members we serve to share their concerns about air quality, participate in monitoring efforts, learn about their environment from the results, and engage in actions to improve air quality and health.
We support your efforts to expand your community-directed air monitoring work and involve our communities directly in air quality research.

Sincerely,

Velma Veloira

Velma Veloira
Former State Representative
Chair, King County International Airport Community Coalition
% Velma Veloria 2106 South Brandon St. Seattle, WA 98108



March 10, 2022

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Mrs. Wang,

The FMS Global Strategies, Founders of the WBBA would like to express support for the Puget Sound Clean Air Agency's (PSCAA) proposal for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks in the Central District and South King County community which is disproportionately impacted by air pollution in the region.

PSCAA has shown a commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand this work and meet the requests of our communities.

This proposal will help to empower community members to lead their own data gathering and learning. This project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

We look forward to collaboratively working with PSCAA on gathering community input on sampling locations and pollutants of concern for designing the study and collecting data with community members. We will also work with PSCAA and community members on identifying next steps based on the results of this study. Partnering with PSCAA on this project will allow the community members we serve to share their concerns about air quality, participate in monitoring efforts, learn about their environment from the results, and engage in dialogue on actions to improve air quality and health.

PO Box 2941 | Renton, WA 98059

I am writing in support of your proposal for an EPA Enhanced Air Quality Monitoring for Communities Grant. We support your efforts to expand your community-directed air monitoring work and involve our communities directly in air quality research.

Sincerely,

Paula F. Sardinas, MBPLA (she/her/ella)

President & CEO
Founder of the WA Build-Back Black Alliance
Phone: (206) 823-9344
Email: paulasardinas@fmsglobalstrategies.com
WBBA: https://www.fmsglobalstrategies.com/wbba
Website: https://www.fmsglobalstrategies.com/

PO Box 2941 | Renton, WA 98059

DUWAMISH RIVER
COMMUNITY COALITION

Elevating the voices of those impacted by the Duwamish River pollution and other environmental injustices to advocate for a clean, healthy, and equitable environment for people and wildlife. Promoting place-keeping and prioritizing community capacity and resilience.

March 18, 2022

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Mrs. Wang,

The Duwamish River Community Coalition (DRCC/TAG) is pleased to submit our letter of support for the Puget Sound Clean Air Agency's (PSCAA) proposal for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks in the Duwamish Valley community which is disproportionately impacted by air pollution in the region.

DRCC/TAG elevates the voice of those impacted by the Duwamish River pollution and other environmental injustices to advocate for a clean, healthy, and equitable environment for people and wildlife. We promote place-keeping and prioritize community capacity and resilience.

PSCAA has shown a commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand this work and meet the requests of our communities.

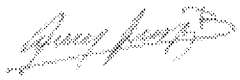
We believe this proposal will help to empower community members to lead their own data gathering and learning. This project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

We look forward to collaboratively working with PSCAA on gathering community input on sampling locations and pollutants of concern for designing the study and collecting data with community members. We will also work with PSCAA and community members on identifying next steps based on the results of this study. Partnering with PSCAA on this project will allow the community members we serve to share their concerns about air quality, participate in monitoring efforts, learn about their environment from the results, and engage in dialogue on actions to improve air quality and health.

We are currently working with PSCAA as a partner of DRCCs Duwamish Valley Clean Air Program, activities include the Seattle and Tacoma Air Toxics Study and the distribution of filter fan kits to the Duwamish Valley Community.

I am writing in support of your proposal for an EPA Enhanced Air Quality Monitoring for Communities Grant. We support your efforts to expand your community-directed air monitoring work and involve our communities directly in air quality research.

Sincerely,



Paulina López
Executive Director
Duwamish River Community Coalition
paulina@drcc.org

7400 S.E. 3rd Ave S. contact@DRCC.org
Seattle, WA 98108 www.DRCC.org
206.251.2938 @DRCC_org

ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

March 21, 2022

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Mrs. Wang,

The University of Washington would like to express our interest in working collaboratively with the Puget Sound Clean Air Agency (PSCAA) and community partners on the proposed project for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks for communities disproportionately impacted by air pollution.

PSCAA has shown a commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand this work and meet the requests of our communities.

This proposal will help to empower community members to lead their own data gathering and learning. This project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

In this project, the UW will be responsible for conducting additional data analyses that complement the community engagement, data collection, tool development and report-back aspects of the proposed project. We have extensive experience working with multi-pollutant datasets to address questions raised by communities that concern the temporal patterns and spatial variations of pollution, the sources that contribute to pollutant mixtures, and the assessment of air pollution health impacts, which we hope to apply to this project.

We are had a longstanding successful relationship working with PSCAA on air quality issues that serve the environmental justice needs of communities in our region. We look forward to continuing to work with you and community groups in the EPA Enhanced Air Quality Monitoring for Communities project.

Sincerely,

Edmund Seto
Associate Professor

ADDRESS
Roosevelt One Building
4225 Roosevelt Way NE
Seattle, WA 98105

CONTACT
(206) 543-1479
eseto@uw.edu
depts.washington.edu

BHCS BEACON HILL COUNCIL SEATTLE

March 19, 2022

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Ms. Wang,

On behalf of the Beacon Hill Council (BHC) of Seattle Washington, we would like to express support for your agency, Puget Sound Clean Air Agency's (PSCAA) proposal for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks in the Seattle Beacon Hill neighborhood which is disproportionately impacted by air pollution in the region from land vehicles and aircrafts.

Beacon Hill neighborhood has 40,601 residents with 73%% people of color (Census 2020) and 44% immigrants and refugees (previous data). Our BHC's mission is to advocate for a welcoming, diverse, and healthy neighborhood.

PSCAA has served on the 2-year Steering Committee for the Beacon Hill air and noise pollution EPA funded education and empowerment project. PSCAA demonstrated to us and others their commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand their work and meet the requests and needs of our collective communities.

This proposal will further assist our Beacon Hill community to continue to lead our own data gathering and learning. As conceptualized, the proposed project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

We strongly recommend funding the PSCAA application. We look forward to collaboratively working with PSCAA on gathering community input on sampling locations and pollutants of concern for designing the study and collecting data with community members. We hope to work with PSCAA and community members to identifying next steps based on the results of this study. This project will allow us as community members to share our collective concerns about air quality, participate in monitoring efforts, learn about their environment from the results, and engage in dialogue on actions to improve air quality and health.

We are writing in support of PSCAA proposal for an EPA Enhanced Air Quality Monitoring for Communities Grant to expand your community-directed air monitoring work and involve our communities directly in air quality research.

Sincerely,
Maria Batayola
Maria Batayola, Chair
c: Beacon Hill Council Board and BHC EJ Task Force

United Chinese Americans of Washington
7345 164TH AVE NE STE 488
Redmond, WA 98052

Phone: 425-522-2668
www.ucawa.org

March 21, 2022

Cynthia Wang
Puget Sound Clean Air Agency
1904 Third Avenue, Suite 105
Seattle, WA 98101

Dear Mrs. Wang,

The United Chinese Americans of Washington would like to express support for the Puget Sound Clean Air Agency's (PSCAA) proposal for the EPA Enhanced Air Quality Monitoring for Communities Grant. This community-directed monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors will help to improve access to air sampling and education on air pollution risks in the Chinese American community which is disproportionately impacted by air pollution in the region.

PSCAA has shown a commitment to equity and environmental justice in the region and has been working to increase community-directed monitoring opportunities based on community interest. This proposal will help expand this work and meet the requests of our communities.

This proposal will help to empower community members to lead their own data gathering and learning. This project will allow for the collection and display of valuable air quality data to help identify air pollution and associated health risks our community faces every day. The central hub equipped with stationary reference instruments coupled with handheld mobile sensors will create important educational and citizen science opportunities for our community members to learn more about the air they breathe, the associated health impacts, and what they can do.

We look forward to collaboratively working with PSCAA on gathering community input on sampling locations and pollutants of concern for designing the study and collecting data with community members. We will also work with PSCAA and community members on identifying next steps based on the results of this study. Partnering with PSCAA on this project will allow the community members we serve to share their concerns about air quality, participate in monitoring efforts, learn about their environment from the results, and engage on actions to improve air quality and health.

We are currently working /have worked with PSCAA in the past on Transit Equity for All project.
I am writing in support of your proposal for an EPA Enhanced Air Quality Monitoring for Communities Grant. We support your efforts to expand your community-directed air monitoring work and involve our communities directly in air quality research.

Sincerely,

Winston Lee

President
UCAWA
Tel: 425-522-2668

ABSTRACT

Funding Opportunity Number: EPA-OAR-OAQPS-22-01
Funding Opportunity Title: Enhanced Air Quality Monitoring for Communities
Project Title: "Community-directed air monitoring with the TREE trailer (Trailer for Researching Environmental Equity) as a central hub with branching sensors to characterize air quality in disproportionately impacted and underserved communities"
Applicant Information: Puget Sound Clean Air Agency, 1904 Third Avenue, Suite 105, Seattle, WA 98101
Primary Contact: Erik Saganić, (206) 689-4003, eriks@pscleanair.gov
DUNS number: 3634223740000
Organization's Brief Description: Puget Sound Clean Air Agency is a special purpose, regional government agency working to protect public health, improve air quality, and reduce our region's contribution to climate change while integrating environmental justice and equity principles. Some current projects include monitoring air toxics in the region, replacing railyard equipment with electric alternatives, and increasing monitoring and awareness in underserved and disproportionally impacted communities.
Project Partners:

1. Dr. Edmund Seto/Dr. Elena Austin, University of Washington, Seattle, WA
2. Ali Lee, King County International Airport Community Coalition
3. Adrienne Hampton-Clarridge, Duwamish River Community Coalition

Project Location: Seattle (Duwamish Valley, Chinatown-International District, Central District), and Lakewood WA
Air Pollutant Scope: Particle pollution ($PM_{2.5}$, Ultrafine particles), Black Carbon, NOx, CO_2, VOCs
Budget Summary:

EPA Funding Requested	Total Project Cost
$499,408	$581,432

Project Period: November 1, 2022 to September 30, 2025
Short Project Description:
In four communities that we have identified as being disproportionately impacted, we will deploy an innovative air monitoring approach using a TREE (Trailer for Researching Environmental Equity) equipped with stationary reference instruments at a fixed location based on community input to explore their neighborhood air quality concerns. Branching out from the TREE will be community-led air monitoring activities (walking or biking tours, etc.) that will use portable hand-held sensors which can be cross-referenced to the research-grade instruments in the TREE.
We will leverage our current web-based tools and develop them further for displaying and communicating the data as close to real-time as possible. Our Univ. of Washington partners will analyze the data to identify dominant sources and health risks. We will share data as it is collected and communicate the results regularly to our community partners, with the aim of increasing awareness, educating, and helping the communities to develop goals and action plans.
Our vision is that this approach can continue beyond the timeline of the grant; and become a beacon for how government agencies and communities can share power, exchange information, and provide disadvantaged communities with flexible, responsive air quality resources.

WORKPLAN

1. Project Summary and Approach

Overall Project Background:
In our region, the communities that bear the highest impact of air pollution also tend to be those with greater socioeconomic challenges. As per EPA's 2020 EJ report, low-income, minority, Tribal, and Indigenous communities are more likely to be impacted by environmental hazards and to live near contaminated lands.[1] COVID-19 also led to increasing reports of racial disparities, where communities of color experience a disproportionate burden of infection and mortality. In King County, communities experiencing high rates of COVID-19 faced a disproportionate cumulative

burden of environmental and social inequities.[2,3] A recent study showed that 80% of tracts in King County with high COVID-19 rates also had the county's highest concentration of $PM_{2.5}$.[4]

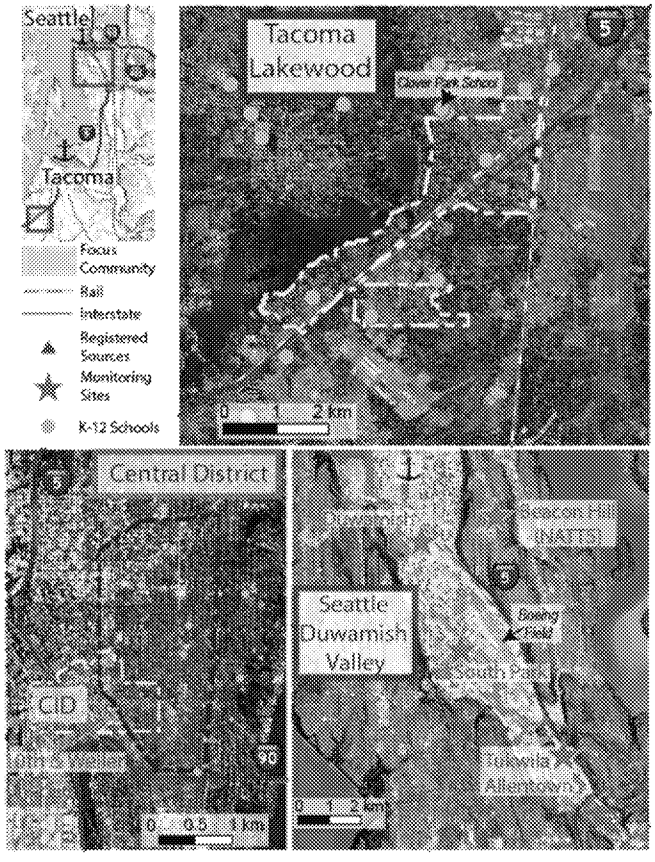
This project will help enhance air quality monitoring in environmentally burdened communities in the Puget Sound region and provide air quality educational opportunities for the community. The four communities we are focusing on in this proposal are within the top 5% of most impacted areas in our jurisdiction, according to our environmental justice map, the Community Air Tool, which scores each block group based on air pollution, health impacts, and demographics. Specifically, we have existing relationships with communities in the Seattle Duwamish Valley and Lakewood, and work with those communities to reduce air pollution exposure and environmental inequity. We would also expand to monitor in new areas, including part of the Central District which is also in the top 5% of impacted areas.

Approach/Activities:

The three-year project will consist of the following four stages:

1) **Community Engagement** (Fall 2022 – Summer 2023)
2) **Monitoring Study Design** (Spring 2023 – Summer 2023)
3) **Data Collection and Display** (Summer 2023- Summer 2024)
4) **Evaluation and Next Steps** (Fall 2024 – Summer 2025)

Figure 1. The study locations in four disproportionately impacted communities



Phase 1: Community Engagement

We will leverage our collective engagement and technical expertise to work with community organizations and the University of Washington to enhance ambient monitoring in disproportionately impacted communities. We will connect with local schools and community-based organizations to identify community members' air pollution concerns and needs. We will facilitate focus groups meetings, workshops, outreach events to increase awareness, provide education resources, and receive inputs from community members.

Based on the concerns shared by community members, we will develop engagement opportunities, create educational materials, develop capacity building activities, and design data collection activities, such as community-led tours, sampling events, or other ideas from the communities. Our community partners will take the lead on defining air pollutants of concern for the community-led sampling campaign from the suite of pollutants mentioned in Phase 3 below.

The attached letters of support indicate the importance of this EPA grant in facilitating a community-based process using community-led sampling along with a central hub (TREE trailer) and community-led monitoring to collect air quality data which will help in filling gaps in areas with limited monitoring. We will also set up agreements with CBOs for the duration of the project to compensate the community members for their time and effort in helping with these activities. The multiple ways we propose to meaningfully engage the community are described in more detail in the Section 2 Community Engagement.

Phase 2: Monitoring Study Design

The four communities where we will conduct sampling for this study are within the top 5% of most impacted areas in our jurisdiction and are shown in Figure 1. Using a survey, we will solicit specific input on hotspot and sensor location from community members at community meetings, outreach events and workshops. The survey will assess two dimensions of concern: air quality/emissions and vulnerability to air pollution. This approach will help us identify places for sensors where pollution sources may not be initially clearly defined or regarding a concern about a particular, not well-quantified source. This may lead us to monitor in new locations that our technical perspective would have not necessarily identified. Similarly, by asking community participants about what populations are the most vulnerable

within the community, we will get additional information about areas that may need targeted monitoring from an exposure and health risk perspective.

Central hub (the trailer, or TREE) monitoring: We will monitor all key pollutants using instruments installed on a trailer that would be stationed at a primary location for a given time duration for appropriate sampling. The trailer will host a Federal-Equivalent-Method (FEM) $PM_{2.5}$ instrument, a $PM_{2.5}$ nephelometer, a black carbon aethalometer, a NOx monitor, a carbon dioxide sensor (for use in factor analysis), and a total ultrafine particle counter along with meteorological instruments. The trailer will also store all hand-held sensors for each pollutant to be used for community-led sampling (PM air sensors such as AirBeam© and PurpleAir©, particle counters such as the Dylos©, microAeths©, and a mobile ultrafine particle counter along with GPSs for geolocation purposes). We are also adding a portable total VOC sensor and VOC canister sampling. Much of this equipment will be leveraged with already supported Agency equipment, including the trailer, the FEM instrument, nephelometer, aethalometer, mobile ultrafine particle counter, and microAeths (see Section 6 Budget for more detail).

Both the Agency and UW have had success previously with trailer monitoring campaigns. UW's recent MOV-UP study utilized temporary site and mobile monitoring data from a combination of instruments to identify contributions from roadway vs aircraft-related source ultrafine particle emissions using a Principal Component Analysis (PCA) based analysis and characterized fuel-based emissions factors by also using monitored CO_2 concentrations.[5] UW also has developed methodology specific to mobile monitoring of air pollution including calibration of mobile instruments, identification of distinct source profiles,[6] calculation emissions factors and study design for development of long-term estimates of exposure.[7,8] These methods will be leveraged in this application to respond to community needs. Our Agency has three regulatory monitoring sites in Seattle Duwamish Valley; one near-road site is next to I-5 in Chinatown International District. In addition, our Tacoma South-L monitoring site is closer to the Tacoma Lakewood area. We will leverage the data for $PM_{2.5}$, Black carbon, air temperature, winds and $PM_{2.5}$ speciation from these Agency's regulatory sites. We will also leverage the data obtained from ongoing air toxics monitoring (2021-22) at Seattle Duwamish site and metals monitoring at community-directed sites around King County International Airport as part of Air Toxics monitoring grant funded by EPA.

Community-led monitoring: Mobile monitoring will consist of collecting air quality measurements by community members through walking and biking tours. Each measurement is geolocated using GPS so that the data can be analyzed in space and time. Both the Agency and UW have had previous successes with mobile monitoring campaigns and will be involved in providing training to community members on operating handheld mobile sensors before the start of monitoring campaigns. Community monitoring has the benefit of providing further flexibility to fill information gaps between fixed site monitors; and can often show considerable pollutant variations along commonly traveled routes within a community (e.g., truck vs non-truck routes, commute arterials, gradients next to major freeways, bike/walking routes, etc.). We may follow one of these approaches based on community's concerns: 1) Sampling at a fixed location for 2 week periods to establish differences in trends when comparing the mobile data to a nearby fixed site; 2) Repeated short-term sampling over the course of a 1-year period to estimate differences in the annual average exposure at a community site as compared to an agency site. Community members will operate hand-held sensors on community-led walking tours to locate hotspots and increase spatial resolution. The community-led walking tours will include a suite of hand-held sensors listed above.

Phase 3: Data Collection, Analysis, and Display

Once the study is underway, the Agency will work in partnership with the community to display and describe any data gained. We aim to implement community feedback loops to share information throughout the timeline of the study. We will make the results of all monitoring available to community members through web-based tools. We already have rich experience in developing applications for community access to data, and will leverage these existing tools in this project, including our Agency Sensor Map, Dashboard, Downloader, Community Reporter, and Ceilometer web pages. The agency plans to leverage existing data display tools for the community's use, such as the HabitatMap's Aircasting platform, the US EPA's Real Time, Geospatial Data Viewer (RETIGO) tool, in addition to our own Community Reporter tools. This provides the community with multiple options to view, and understand data, in addition to sharing data with other communities.

UW will integrate the data collected by community members with state-funded mobile monitoring data collected by UW researchers using research-grade instrumentation (e.g., total and size-specific UFP, BC, $PM_{2.5}$ nephelometer, NO_2, CO_2) to further extend the spatial coverage for comparisons between communities as part of the current Washington Healthy Air, Healthy Schools study.[9] After monitoring, UW will analyze the data to visualize short-term temporal patterns and map of spatial variations and hotspots. UW will also conduct factor analysis to identify source contributions which can help in developing mitigation strategies for the communities subsequently. Other potential analyses that may provide answers to community partners' questions include estimating source emissions factors, normalized by kg of fuel burned,[10] allowing for an analysis of the potential health benefits from reducing the observed pollutant concentrations emissions measured using the TREE and mobile data; using EPA's BENMAP/COBRA (with downscaled regional estimates) for assessing health risks from certain pollutants, such as $PM_{2.5}$; back-trajectory analysis using pollution roses using TREE wind data to understand the potential impacts of meteorological patterns on high-concentration episodes observed; or a cumulative impacts analysis that assess overlap between the monitoring data and other environmental justice spatial indicators from Washington's census tract-level Environmental Health Disparities Map[11,12] and EPA's EJ Screen.

Phase 4: Evaluation and Next Steps

At the completion of the project, we will report the study's results back to the community through workshops in each of the communities to explain the results and findings of the study. More importantly, we will help the community to craft a 'next steps' plan. We will work with community residents to prioritize for themselves a plan of action based on the results of this study. We have extensive experience as an Agency with voluntary incentive programs that may help alleviate air pollution in areas the community collectively identifies. For example, the Agency has run very successful truck scrappage programs in the nearby Port of Seattle in partnership with other organizations as a part of Northwest Ports Clean Air Strategy, as well as wood stove removal and scrappage programs throughout the Puget Sound region. The Agency also helps the communities reduce their exposure during high pollution episodes, like from wildfire smoke, by providing filter fans to community members. While we do not directly control many local processes and decisions related to policies, we can certainly help community members to use the information from this study to advocate for clean, healthy air.

Part of the final report will be an evaluation of changes in knowledge, attitudes, perceptions, and behaviors (KABP) that have occurred through participation in this project. Community members and key staff/leadership at Community Organizations will be given a pre-study survey to collect residents' opinions on air quality issues. We will also conduct a post-survey to determine how KABP related to air quality have changed in the community for study participants Internally, we will create a 'lessons learned' document for internal evaluation of how this engagement in a diverse community could be improved: what worked well, and what may be improved. The Agency has several other disproportionately impacted communities we want to focus on – where possible, we would like to apply what we learn in this study to these other communities as well.

Project Significance

Innovation

First, this proposed study is innovative in its collaborative nature, bringing together a regional air pollution control agency, an academic university partner, and motivated residents and community groups to invest time and effort to address a multitude of air pollution concerns in disproportionately impacted and culturally diverse areas. Both the Agency and UW have previous experience with mobile monitoring and low-cost portable air quality sensors and can facilitate the use of these sensors by the residents in underserved communities. Second, in the interest of collecting data which addresses community's concerns, we are proposing to deploy sensors that are easy for community members to use. Third, our approach to sensor deployment is also innovative, leveraging the best of all deployment approaches: (a) a central hub trailer (the TREE) composed of air sensors and FEM instruments to allow for continuous calibration of air sensors against reference instruments trusted and familiar in regulatory practice[13] and (b) community directed walking or biking tours which can fill in spatial gaps between the fixed site monitors and allow for monitoring of emerging traffic related pollutants such as BC and UFP. The combination of data from these different deployment modes will lead to innovative methods for data fusion, and opportunities for our community partners to engage with the

monitoring data and compare/contrast findings between the multiple ways data collection is performed. Additionally, we are proposing to use tools to make monitoring data more accessible to the public and find ways to improve data handling/storage for the mobile dataset.

Sustainability

The collaboration between the community, the Agency, and UW will strengthen our understanding of air quality in four of the most disproportionately impacted neighborhoods in the Puget Sound region. The insights we gain will guide the next steps toward mitigating air quality impacts from pollution sources and hotspots identified through this partnership. The Agency is committed to continue working with these communities beyond the grant as they identify workable priorities and solutions. Not only are we interested in understanding the specific experiences the community will have in using the sensors and interpreting the data, but we hope that the lessons learned from this study will be generalizable to other disproportionately impacted communities. Further, this project will strengthen the ability of the Agency to prepare for a future of community engaged research with high resolution data from low-cost portable air quality sensors. The technology and infrastructure that is developed to help display and communicate the air quality data will be used for future projects at the agency. Maintaining and building on these systems is an essential part of our ability to engage with the public as the use of this sensor technology becomes more widespread.

2. Community Involvement

Identify Key Stakeholders and Community Feedback

The Agency has started the first step of the study's community engagement plan by identifying and engaging with key community members and other interested stakeholders. We have been engaged in discussions regarding communities' concerns with local and community-based organizations that have experience engaging underserved and diverse populations. Some of our identified key stakeholders who have agreed to assist in neighborhood outreach efforts and education initiatives are:

- **King County International Airport Community Coalition (KCIACC):** KCIACC works for health, climate, and environmental justice to preserve the history and uplift the long-standing impacted communities in Allentown-Tukwila, South Park, Georgetown, Beacon Hill and Duwamish Valley Neighborhoods from aviation and environmental racism. KCIACC which includes Puget Sound Keepers, FOGHI, 350 Aviation, Eco Infinity, Duwamish River Community Coalition, Friends of Georgetown, Spean Rajna, Climate Leaders Affinity, and local environmental activists
- **Washington Build-Back Black Alliance (WBBA):** WBBA is an alliance of black and other BIPOC non-profit executives and business leaders from 15 of the most prominent organizations. Their mission is to connect the black community (young and established) by advocating in a cooperative fashion for shared generational prosperity. They have been working on advocating environmental justice and working on healthcare disparities faced by the communities.
- **Duwamish Valley Youth Corps**: Duwamish River Cleanup Coalition/Technical Advisory Group (DRCC/TAG) developed the Duwamish Valley Youth Corps (DVYC) as a youth engagement program focusing on environmental justice and job skills. Most of the youth are children of color, from low-income households, and many are immigrants and/or non-native English speakers. currently working with PSCAA as a partner of DRCCs Duwamish Valley Clean Air Program, activities include the Seattle and Tacoma Air Toxics Study and the distribution of filter fan kits to the Duwamish Valley Community.

Community Partnerships

We will build on our existing collaborations with local schools and community-based organizations (CBOs), and also seek partnerships with additional CBOs to facilitate the study. We will work collaboratively with CBOs and co-create a monitoring plan for setting up the monitoring hub and conducting portable air sampling in four neighborhoods.
Our community engagement and partnerships plan has three main components:
1) community outreach and involvement in selecting community monitoring sites and identifying research questions,
2) community led monitoring, and
3) community updates and dissemination of results.

1) For the community outreach and involvement component, we will leverage our existing relationships with key stakeholders in the focus communities described in Section 3 to assemble community coalitions to aid in study design. Table 1 contains an initial list of key stakeholders by focus community and related project activities. With the help of key stakeholders, we will facilitate a community-driven monitoring site selection process, which will include providing information on local air quality, health impacts, key emissions sources, and monitoring capabilities. The key stakeholders will help us to identify the most appropriate formats and venues for engaging with community members. Following a multilingual, multi-format process for gathering community input, similar to the CID Air Toxics Study[14], we will identify a total of four community-directed targeted monitoring sites in each of the neighborhoods, in areas of greatest community interest.

Table 1. Key stakeholder organizations and their respective project activities

Community	Key Stakeholder Organization(s)	Project Activities
Seattle Duwamish Valley	King County International Airport Community Coalition; Public Health Seattle-King County, Beacon Hill Council	Community education and outreach; Designing Monitoring Study; Evaluation and Next Steps
	Duwamish River Cleanup Coalition, Duwamish Valley Youth Corps	Designing Monitoring Study; Data Collection; Evaluation and Next Steps
Lakewood	Clover Park School District; Communities in Schools	Community education and outreach; Data Collection; Evaluation and Next Steps
	Tacoma-Pierce County Health Dept	Community education and outreach; Designing Monitoring Study; Evaluation and Next Steps
Central District	WA Build-Back Black Alliance; Africatown, Wa Na Wari	Community education and outreach; Designing Monitoring Study; Data Collection; Evaluation and Next Steps
Chinatown International District	SCIDPDA, Interim, United Chinese Americans of Washington, Wild Youth group	Community education and outreach; Designing Monitoring Study; Data Collection; Evaluation and Next Steps

2) For the second component, we will monitor using instruments mounted on a trailer that is located at the community-identified primary location. Community members will be provided training by Agency staff before monitoring campaigns so that they are able to operate hand-held sensors (for instance, Dylos, AirBeams, microAeths, etc.) on community-led walking tours to locate hotspots and increase spatial resolution. We will make the results of all monitoring available to community members through an online tool (like our Agency Sensor Map, Dashboard, Downloader, and Community Reporter) for public access. Other options for the community lead projects include using the Aircasting, or the RETIGO tools for data display.

3) For the third component of our community benefit, engagement, and partnerships plan, we will provide quarterly project updates by email to all key stakeholder organizations and any other interested community groups and will meet at least twice a year with key stakeholders to provide updates in person, answer questions, and receive feedback. We will also work with key stakeholders to explore opportunities to disseminate project updates more broadly, such as distributing them via community newsletters, newspapers, bulletin boards, or community events.

Community Engagement

Community involvement is crucial to the success of this study. Neighborhood residents and local stakeholders will play a vital role in developing and implementing the study's components. We will strive to foster partnerships with existing community groups and residents wherever feasible, particularly local school-affiliated and other community liaison programs as suggested by community members. The study will also aid in the continued long-term relationship-building process that the Agency has been nurturing with these communities and will allow us to create meaningful dialogue about how air quality issues affect residents' day-to-day life.

The community engagement phase of the study is intended to spark discussion in the community about air pollution issues and involve community members in the formation of the study. Involvement of residents in the study could range from providing input on potential study options to actively participating in air monitoring with microsensors by collecting data on an ongoing basis. The study's community engagement methods will be strongly influenced by this

plan's initial steps (preliminary community meetings and surveys), and may also incorporate the following tools to involve the communities regarding air pollution issues and design of an air quality study:

- **Community meetings/workshops** – traditional public meetings or smaller, objective-oriented workshops could be used to discuss air pollution (and its causes). Meetings or workshops would help shape the study and the level of involvement of the community. Ideas to encourage participation include mapping air quality "hot spots" with attendees and using community liaisons to spark small group discussion and provide best practices for implementing the study. When possible, we will work to build these workshops into existing community meetings and event opportunities.
- **Neighborhood tours** – After an initial education and training session on handling sensors, community members would lead Agency staff on tours of the neighborhood with the portable sensors, illustrating typical walking and biking routes (to grocery store, community center, etc.) and providing air quality data to inform the area's air quality hotspots.
- **Language access services** – with many languages spoken within these communities, language access services will be essential. Preliminary information gathering from surveys and community member meetings will be necessary to determine all languages used within the neighborhood.
- **Post-study survey** – once the study has been designed and fully implemented, another questionnaire and verbal survey will be conducted to gauge any changes in opinion on air quality issues and evaluate the study's engagement and communications components.

3. Environmental Justice and Underserved Communities

In our region, the communities that bear the highest impact of air pollution also tend to be those with greater socioeconomic challenges. For example, lower income communities and communities of color face higher exposure to diesel exhaust. Our Agency's Strategic Plan prioritizes air pollution and exposure reductions for communities that historically experience challenges to economic opportunity and decision-making access in order to champion clean and healthy air for all. Our environmental justice map, the Community Air Tool (CAT)[15], helps us identify systemic impacts, where air quality, health, and socio-economic factors overlap.[16] With help from the CAT, we have identified four communities as Focus Communities for enhanced work in the coming years. Three of these focus communities are the study region for this study (Figure 1).[17] This project will also give the Agency an opportunity to engage with one other disproportionately impacted community that has not yet been identified as Agency focus community. Table 2 also quantifies the underrepresented minorities and some of the socioeconomic barriers in these areas.

Table 2. Summary of the Community Air Tool score (higher is more impacted) and select factors from EJ Screen illustrating some of the disparities for the four communities.

Categories	Duwamish Valley	Lakewood	Chinatown International District	Central District
CAT score (out of 35)	**27.5**	**24.5**	**30**	**21.0**
Density of Registered Sources (out of 3)	3	1	0.6	1
Washington Health Disparities Score (out of 10)	10	8.8	9.5	8.2
EJ Screen values				
People of Color Population	59%	54%	70%	40%
Low Income Population	42%	52%	48%	27%
Linguistically Isolated Population	11%	6%	28%	4%
Population with less than High School Degree	14%	16%	24%	5%
EJ Index (percentile compared to state)				
EJ Index for $PM_{2.5}$	87%ile	90%ile	91%ile	69%ile
EJ Index for NATA Diesel PM	93%ile	93%ile	98%ile	61%ile
EJ Index for NATA Air Toxics Cancer Risk	89%ile	91%ile	94%ile	68%ile
EJ Index for Traffic Proximity and Volume	95%ile	98%ile	99%ile	79%ile

The Duwamish Valley focus community includes the neighborhoods of Tukwila-Allentown, Seattle Georgetown, and South Park. The area is both diverse in the places and the people that make up the community. The community is rooted in an industrial setting, is bounded by railyards, a major airport (Boeing Field), industrial sources, and major

roadways. The area includes a Superfund site, which has had a century of industrial pollution and studies have shown substantial deposition into the ground water and soils of PCBs and metals, including substantial buildup in the Duwamish Waterway. We have partnered with this community over the years in many ways.[18]
Seattle's Chinatown-International District (CID) focus community has been a vital centerpiece of Seattle's Asian American community, with a rich multiethnic neighborhood of Chinese, Japanese, Vietnamese, Filipino and other origins. Bounded by Interstate 90 to the South and cut by Interstate 5, they are exposed to the highest traffic volumes of the Pacific Northwest.[19] The Community Air Tool ranks this community in the top 1% most disproportionately impacted areas in our jurisdiction.
The Lakewood focus community has a rich history, commercial districts, parks, and a diverse population. Lakewood and the larger, adjacent Tacoma-Pierce County $PM_{2.5}$ maintenance area (for the 2006 24-hour $PM_{2.5}$ standard), is intersected by Interstate 5, contains several state highways, a large industrial footprint, and a major air-force military base. Lakewood is the Agency's newest focus community which was identified in 2019.[20]
The Seattle Central District community is vibrant and includes a very diverse population. It is considered by some to be the center of the African American community in Seattle with many engaged community groups dedicated to keeping the community thriving. It has been experiencing a lot of development resulting in gentrification and rising costs. While not an identified focus community, the area is very much disproportionately impacted by air pollution and other injustices. The Agency is looking forward to developing long-standing partnerships in the community.

This study will bolster our longstanding relationships with community groups in several of these areas and provide opportunities to forge and strengthen new relationships in others. It will also increase our ability to respond to emerging issues in exposure. It will also leverage our expertise in community-driven monitoring developed through our 2016-2018 EPA-funded Near-Road Air Toxics Study in the Chinatown-International District (CID Air Toxics Study).[5] Engaging with community members throughout all phases of this study will provide us with a forum to have meaningful dialogue about air quality and how it affects residents' day-to-day lives.
The community benefit, engagement, and partnerships plan is intended to stimulate discussion within each community about air pollution issues, empower communities to advocate for their air quality, and provide them tools to make evidence-based health decisions. This plan has been informed by previous Community-Scale Air Toxics Ambient Monitoring projects, including our own, and we intend to share the results of this community engagement effort with other local, regional, tribal, state, and national partners to inform their future efforts. We intend to present our findings in a variety of venues, including NW-AIRQUEST, the National Association of Clean Air Agencies, and a national air quality conference. We also intend to offer a webinar for EPA and local, regional, state, and tribal air officials and researchers on the results and outcomes of the community engagement elements of this project.

4. Environmental Results – Outcomes, Outputs, and performance measures

Expected Project Outputs and Outcomes
Our proposed work will respond to EPA's goal "A Cleaner, Healthier Environment" by enhancing monitoring within disproportionally impacted communities that suffer from poor air quality in addition to substantial socio-economics challenges and disparities stemming from pollution and the COVID-19 pandemic. We will support community and local efforts to monitor their own air quality while making sure "high air quality standards" are met.

Anticipated environmental **outputs** from the proposed work:
- Producing high quality monitoring data, which will be made publicly available via the Puget Sound Clean Air Agency's website
- Identification of community-specific air quality trends and source contributions
- Disseminate results via public meetings with community members to raise awareness and discuss key findings on one or more air quality issues of concern in the communities
- A final report, which will include a summary with key findings for the communities to identify priority pollution sources which will shape future air quality work in the neighborhood.

Anticipated environmental **outcomes** from the proposed work:
1. *Short-term:*

- Engage with the local community by establishing partnerships with community-based organizations and local schools.
- Comparison of pollution levels between community chosen monitoring sites and mobile runs to existing regulatory sites.
- Develop engagement opportunities, create educational materials, develop capacity building activities, and design data collection activities, such as community-led tours, sampling events, or other ideas from the communities.

2. *Mid-term:*

- Identify areas and air pollution sources of concern around the community.
- Community-specific assessments of air pollution data to identify the biggest concerns associated with air pollution in the focus communities.
- Near real-time air quality data availability for communities and other stakeholders.
- Help identify air quality trends and source types to prioritize.
- Empower respective communities with the results, and collaboratively discuss one or more air quality issues of concern.

3. *Long-term:*

- Increase community monitoring and build a foundation of trusting relationships and enhanced understanding with the community members to find sustainable solutions to community problems.
- Future priorities for air quality trends and source reductions are more accurately identified.

Performance Measures and Plan

- All monitoring activities will comply with instrument SOPs and the QAPP.
- Project manager will hold routine meetings with the project team to review the work and the project timeline.
- Project manager will check budget balances with managers monthly and adjust as needed.
- Communication with EPA's program manager will be maintained through quarterly progress reports and check-ins as needed.

Timeline and Milestones

Table 3. Timeline of the proposed work for: community engagement (light grey), monitoring/analysis (dark grey), and reporting (black)

Timing:	*Year 1: 2022-2023*				*Year 2: 2023-2024*				*Year 3: 2024-2025*			
Milestones:	*Fall*	*Win.*	*Spr.*	*Sum.*	*Fall*	*Win.*	*Spr.*	*Sum.*	*Fall*	*Win.*	*Spr.*	*Sum.*
Community engagement												
Input from communities on project and timeline												
Finalize study design												
Generate SOPs												
Progress reports to EPA												
Trailer sampling												
Community-led sampling												
Outreach events												
Data analysis/data displays												
Draft report												
Inform communities on findings and discuss air quality concerns												
Final report												
Final outreach events												
Community "next steps" plan												

5. Programmatic Capability and Past Performance

Past Performance

We have a proven track record of fulfilling past EPA grant work successfully and on time. Here are a few examples of recent Federal Assistance Agreements:

1) **Seattle and Tacoma Air Toxics Trends in Sources and Risk, in progress**
   Funding Agency: EPA, No: XA-01J87901
   Grants Totals: $657K; Grants Combined Total: $772K
   We are performing a study to assess air toxics trends and risk in Seattle and Tacoma. The study focuses on changes in air toxics concentrations from diesel exhaust sources, wood smoke, ethylene oxide, and industrial source metal emissions. We are monitoring and analyzing air toxics risks using monitoring that has been directed by the environmental justice communities in order to assess if there are additional equity gaps.
2) **Electrification of BNSF, in progress**
   Funding Agency: EPA, No. DE-01J9850101
   Grants Totals: $1M; Grants Combined Total: $2.7M
   This project is to replace 9 diesel-fueled, tier 3 yard trucks with 9 all-electric yard trucks at BNSF's South Seattle Intermodal Yard. This project will make it possible for BNSF to electrify their entire yard truck fleet of 20 yard trucks as the remaining 11 are aged out over the next five years.
3) **School Bus Engine Replacement Grant, in progress**
   Funding Agency: EPA, No: DE-01J53801-0
   Grant Totals: $1.38M
   EPA awarded Grant No. DE-01J53801-0 in 2018 to the Agency to administer a program to scrap and replace diesel school buses with propane school buses in the Puget Sound region. The project goal was to scrap 22 qualifying diesel school buses and replace with propane-fueled school buses. Through strong project management and partnership development, the Agency has successfully administered 23 replacements and is drafting the final report.
4) **Marine Engine Replacement Program, in progress**
   Funding Agency: EPA, No: DE-01J40801
   Grant Totals: $650K; Grants Combined Totals: $1,541K
   EPA awarded Grant DE-01J40801 in 2017 to the Agency to scrap and replace 12 old marine engines with new Tier 3 or better engines in the Puget Sound region. To date we have met the deliverables on this grant both in the number of engines replaced and total project emission reductions, despite several setbacks including one project cancelation due to COVID-19. We are currently working on a bonus project to use unallocated funds. This program improved the air quality for industrial and residential communities adjacent to Puget Sound, Lake Washington, and Lake Union, and reduce deposition of air toxics into sensitive waterways
5) **Cargo-Handling Equipment Electrification 2020, in progress**
   Funding Agency: Ecology/EPA, No. 01J63601
   Grant Totals $870K; Grants Combined Totals: $1.05M
   Ecology subaward OTG-2020 PSCAA-0024 in 2020 to scrap and replace diesel cargo-handling equipment with all-electric cargo-handling equipment. The project's goal is to replace 6 cargo-handling units. We are on track for the units to be replaced in summer 2023.

Reporting Requirements

We have a proven track record of fulfilling reporting requirements for past EPA grant work successfully and on time. The aforementioned projects are in progress, and for all of these projects, we have submitted quarterly progress reports on time. For our past projects which have been completed, we have achieved our expected outputs. We have a track record of submitting the final project reports and financial reports on time to EPA. We have agency policies that ensure wise and appropriate use of federal grant funds, and our state auditor routinely audits our agency's use of federal grant funds, with no findings in recent years.

Staff Expertise

Our Agency has vast experience in conducting community engagement and outreach projects. We have a deep bench of staff skilled in air quality monitoring, data analysis, and community engagement. The key Agency staff have graduate degrees in Environmental and Atmospheric Sciences, and extensive experience in data analysis and reporting. Our Equity and Engagement team has conducted many outreach, education, and engagement events in our four-county region.

Both the Agency and UW have had success previously with mobile monitoring campaigns using trailers in multiple projects. The biographical sketches of our key personnel demonstrate their qualifications and past experience in conducting such studies successfully.

6. Budget

Budget Detail

See form SF-424A sections A-F in this grant application package for more details. The following table contains the itemized costs related to each budget category.

Table 4. Itemized costs related to each budget category

Budget Category and Detail	EPA Funding	Cost-Share
Personnel		
(1) Air Monitoring Lead @ $64.75/hr x 3.1 hr/wk x 130 wk		$25,720
(1) Air Resources Specialist @ $55.92/hr x 3.1 hr/wk x 130 wk		$22,755
(1) Environmental Justice Coordinator @ $44.83/hr x 2.8 hr/wk x 78 wk		$9,938
(1) Air Monitoring Specialist II @ $55.92/hr x 7.5 hr/wk x 156 wk	$65,361	
(1) Communications Specialist @ $44.83/hr x 1.9 hr/wk x 130 wk	$11,309	
TOTAL PERSONNEL	*$76,670*	*$58,413*
Fringe Benefits		
40.42% of salary		
TOTAL FRINGE BENEFITS	*$30,990*	*$23,611*
Travel		
Airfare for 3 trips for conference attendee/s (one or more conferences)	$1,550	
2 nights for 3 conference/s	$1,500	
2 days per diem for 3 conference/s	$450	
TOTAL TRAVEL	*$3,500*	*$0*
Equipment		
Ultrafine monitor	$65,000	
NOX/NO2 monitor	$22,000	
NOX/NO2 calibrator systems	$10,000	
MicroAeths/Partector systems(x2, $12,000/unit)	$24,000	
CO_2 sensor	$6,000	
VOC sensor	*$6,000*	
TOTAL EQUIPMENT	$133,000	*$0*
Supplies		
Battery or Power system or Power installations for trailer	$10,000	
Printed materials for community outreach	$2,000	
Translation Services for Surveys, Outreach material	$7,000	
Sites operational hardware (calibrations, probes, filters, consumables, etc)	$6,000	
TOTAL SUPPLIES	*$25,000*	*$0*
Construction		
TOTAL CONSTRUCTION	*$0*	*$0*
Contractual		
TOTAL CONTRACTUAL	*$0*	*$0*
Other		
UW Project Partner – Data Analysis	$99,957	
Community Partners Compensation (for inputs during planning; and monitoring)	$60,000	
TOTAL OTHER	*$159,957*	*$0*
Indirect Charges		
65.29% projected Federal Negotiated Indirect Cost Rate (based on FY18)		
TOTAL INDIRECT	$70,291	$0
TOTAL FUNDING	(fed) $499,408	(non-fed) $82,024
TOTAL PROJECT COST (federal and non-federal)		**$581,432**

Reasonableness of Costs

Fringe benefits include tuition reimbursement; transit; medical insurance, dental insurance, vision insurance, life insurance, short term disability admin., employer's PERS contribution, Employee Assistance Program, leave liability adjustment, L&I workers compensation insurance; L&I admin fees; and unemployment account payment. Travel will be to present at the EPA National Air Monitoring Conference to share project results. In equipment, ultrafine monitor, NOx monitor, and CO_2 sensor will be used to collect data in the TREE trailer which will be used for source characterization using factor analysis. VOC sensor and microAeths will be used to collect data during community monitoring tours and will help increase spatial resolution. In Supplies, we have included the costs for translation services for surveys and outreach material for translation to multiple languages. Other includes the staff costs for our project partner, UW for two faculty and a graduate student involved in the data analysis in Phase 3. We will also be compensating our community partners and community members for their time and effort during initial planning for study design and their involvement with community-monitoring which will help in building strong and long-term partnerships.

Voluntary Cost Share and Leveraged Funds

We are committed to a legally obligated cost-share of $82,024 as described in Table 4 and Form SF-424A in this application package. We will pay this amount from our per capita tax and state core grant; no federal funds will be used. Note regarding Personnel In-Kind Cost share: PSCAA will separate staff cost centers specifically to avoid any federal funds being used from our WDOE CAA 105 PPG (Washington State Department of Ecology Clean Air Act section 105 Performance Grant) and this grant at the same time.

We will also leverage additional resources not included in the itemized cost-share in this application, including fuel and vehicle use for transportation to the sites; the trailer, a FEM $PM_{2.5}$ instrument, a $PM_{2.5}$ nephelometer, black carbon Aethalometer for the TREE trailer; and particle counters (Dylos and Purple Air), mobile ultrafine monitor, microAeths, and VOC sensor for community sampling. We will also leverage the use of our calibrated flow devices and other maintenance tools, equipment, and accessories for the project.

Expenditure of Awarded Funds

We will continue to follow our strict purchasing, contract, and grant policies to ensure we meet EPA and local government requirements. Internally, we will continue to have project team meetings to ensure we are meeting milestones and deadlines on schedule. We will follow the timeline in Table 3 and ensure we meet the three-year timeline to complete the project from notice of being awarded the grant.

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